ELECTRICAL REVIEW

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9th January, 1948

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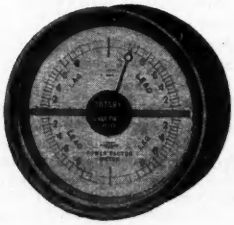

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ELECTRICAL REVIEW
THE OLDEST ELECTRICAL PAPER -- ESTABLISHED 1872

Vol. CXLII. No. 3659 9th JANUARY, 1948 9d. WEEKLY

High-Voltage Standards

Preparing for International Connection

IT is generally accepted that standardization of designs should not be attempted until experience has indicated those most fitted for survival. The fewer the details of construction involved, the less the risk of stabilizing practice at an inferior level, until a point is reached at which certain broad principles must be established in order to create a framework for more particularized activities.

A case of this kind is presented by the transmission of electricity at voltages that are high enough to foreshadow the possibility of ultimate interconnection of systems with the aim of utilizing all natural generating resources and conveying current to load centres irrespective of national frontiers. An analogy may be drawn from the unification of gauges in the early days of railways which has made through running possible on a large scale to-day.

Greater Power : Wider Range

The question of voltage standardization is now engaging the attention of the International Electrotechnical Commission, and the present position is summarized by Mr. P. Ailleret in this issue (page 59). With the rapid growth in the consumption of electricity all over the world, the amount of power to be transmitted increases to an extent that necessitates the raising of voltages, for the reasons which he gives, as soon as engineering progress makes this practicable. Greater distances are thereby brought within economic range, thus facilitating interconnection of existing high-voltage networks, which would themselves continue to function for more localized purposes. Many foreign systems are operated at about 220 kV, with national differences of 10 per cent or so, and investigations are now in hand to decide the next stage in the inevitable upward trend, which such possible developments as phase-angle compensation would only postpone.

British Conditions

In Great Britain, grid conditions settled 132 kV as the most suitable value. There is no commitment therefore to Continental practice, which Mr. Ailleret believes would desirably have taken 280 kV instead of 220 kV as a criterion, and he mentions 275 kV as likely here. There is, as he implies, no sacrosanct merit in multiples, and if 275 instead of 264 kV should promise to be technically feasible, the maxim that enjoins going for the higher voltage when in doubt should prevail. Ultimate connection with the Continent of Europe should not be ruled out, possibly by a d.c. link, which present indications seem to assign to longer-distance service with smaller loads than those we have in mind.

At present British interests are mainly concerned with a second aspect of international high-voltage standards, that of interchangeability of equipment, which encourages the reflection that experience in manufacture for the highest voltages argues ability to cope with lower values. The continents of the Americas, Asia and Africa are also affected similarly. It is necessary now to decide upon a world standard for conditions ten to twenty years ahead. The trend of opinion seems in

favour of 380-400 kV, if experiments being carried out in various countries show this standard to be warranted. These also indicate a welcome realization of the need to reach agreement as soon as possible in order that there may be no hindrance to interconnection with its great potentialities for furthering electrification.

The Honours List

Most prominent among the electrical names which appear in the New Year's Honours List are those of Mr. V. Z. de Ferranti and Dr. J. D. Cockcroft, who are to be knighted. Mr. de Ferranti has worthily upheld an illustrious name on both the technical and industrial sides of electricity. Dr. Cockcroft has earned international fame by his achievements in the realm of physics. Among the other new knights are two prominent educationists, Dr. R. V. Southwell, Rector of the Imperial College of Science, and Mr. H. Claughton, Principal of the University of London. The C.B.E.'s include Mr. G. L. H. Brough, Deputy Director of Electrical Engineering at the Admiralty, and the secretary of the Institution of Civil Engineers, Mr. E. G. Clark. Several electrical engineers are included in the list of O.B.E.'s, among them being Mr. C. T. S. Arnett (C.E.B.) and Mr. E. G. Phillips (E. G. Phillips, Son & Norfolk). A number of engineers and industrialists appear among the M.B.E.'s.

Area Boards

At the eleventh hour (if 1st April is to be the vesting date for the electricity undertakings) the appointments to membership of the Area Electricity Boards were announced by the Minister of Fuel and Power. Six of the fourteen have the legal minimum of four members; only the London Board has the full complement of eight (to be supplemented later by the Consultative Committee chairman). The electricity supply element in the new organization as a whole is strong. Including members of local authorities, over half the eighty or so members of the Central Authority and Area Boards are or have been connected with the industry and many others have some affiliation. There are a dozen or more industrialists and four agriculturists. The trade union element is not so great as some people thought it would be; we can only identify seven who fall solely under this heading. There are only four women, but probably this disproportion will be redressed in the appointment of the Consultative Councils.

Compensation Stock

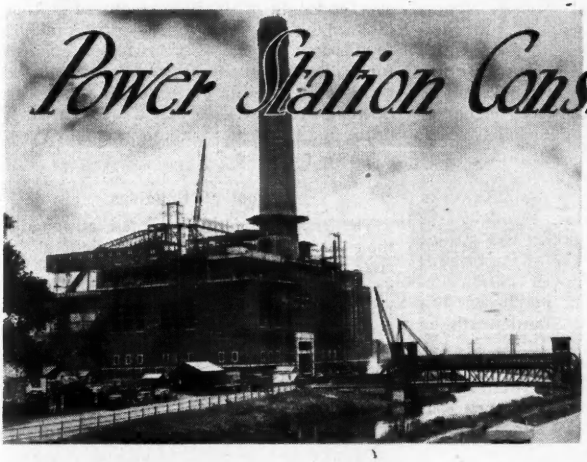
Shareholders in electricity supply companies are naturally very interested in the terms of issue of British Transport Stock as a pointer to what they may expect in the way of compensation. The subject is dealt with on page 67 of this issue. Generally the "market" is said to be disappointed, but the Railway Stockholders' Union has expressed its satisfaction at the fact that the stock bears interest at 3 per cent instead of the 2¼ per cent originally anticipated. As in the case of Transport Stock, in estimating the value of Electricity Stock to be issued the Treasury is to have regard to the market value of Government securities at the vesting date.

Wiring in New Houses

It seems that attempts of the Ministry of Health to keep the prices of new houses within a given limit are sometimes made partly at the cost of the electrical installation. A recent E.D.A. deputation to the Ministry urged that consideration should be given to the increasing of the amount of £35, indicated nearly a year ago as being reasonable. Since then the cost of materials and labour have risen substanially. The Ministry's reply was that it was not prepared to agree entirely as the cost of the houses had to be kept within limits and sometimes the amount of the electrical installation had to be reduced. A "general assurance" was given that the Ministry wished to see the housing standard kept up.

Suitable Coal

Although a modern water-tube boiler can be adapted to operate over a wide range of fuels, its output and thermal efficiency depend upon its being provided with the class or grade of coal for which it was designed. Last year, the output of generating plant sterilized by the use of unsuitable and inferior coal sometimes reached 380,000 kW. The present shortage of both coal and generating plant reinforces Mr. Eric Yarrow's plea (alluded to in last week's issue) that return should be made as soon as possible to the former practice of supplying power stations with appropriate fuel.

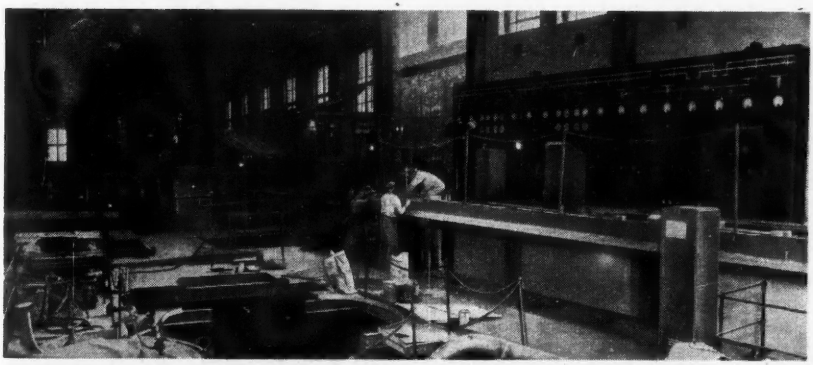


Power Station Construction

Progress at Lincoln

ABOUT a year ago, when describing in its constructional stages the Meaford generating station of the North-West Midlands Joint Electricity Authority, we said that we proposed to describe new power stations in this country in two parts—one part at a suitable point during the constructional stage and the second part at a time after the plant had been running long enough to overcome its teething troubles. In this way we believe we shall be able to present to our readers much more lucid accounts of both the constructional and operational aspects of any one station than can be done by the mixture of both of these in one article. Our view is based on these three essentially practical considerations: (*a*) the modern power station, representing some millions sterling of capital expenditure, a few years of design and labour, and nearly always an intricate scheme involving the application of modern advances in civil, mechanical, electrical and combustion engineering to a particular set of chosen and local conditions, cannot be described adequately in one normal article; (*b*) the increasing specialization in each of the constructional and operational aspects demands a greater degree of division in their presentation than hitherto; and (*c*) it is undesirable from the broader aspects of news release, etc., to delay the publication of the entire description of a power station until its completion.

Another new power station which has now reached a suitable point for the publication of a description of its constructional features is the new St. Swithin's generating station of the Lincoln Corporation electricity supply



The turbine house is aligned with the remaining portion of the old turbine house ; normal electrical control will be effected from a control board on a platform about 4 ft (1·2 m) above the operating floor

undertaking, and we thank Mr. F. Newey, M.I.E.E., engineer and manager, for permission to visit the station and prepare this article. The station is situated on the north bank of the River Witham at a point about ¾ mile (1·2 km) from the centre of the city of Lincoln. The site is also immediately south of the L.N.E. Lincoln-Grimsby railway, and the major buildings are at the extreme west corner of the site formed by the junction of this railway and the river. Actually the major buildings, i.e., the boiler and turbine houses, are partly on the site of the original Clayton & Shuttleworth power station site. The Lincoln Corporation purchased this station from Clayton & Shuttleworth in 1919 when the plant comprised three 795-kW A.E.G. and one 2,000-kW B.T.H. sets. In 1922 two 5,000-kW B.T.H. sets were added, and these are still in service. The first four sets were removed in 1934 and were not replaced in the old station.

Wartime Suspension

In 1939 a direction to install the first 20,000-kW set, two 120,000-lb (54,400-kg) per hour boilers and other ancillary plant was received, but owing to the outbreak of war work was suspended. In 1944 work actively commenced on the construction of the new station, which involved taking down the south and west walls of the boiler house and the south wall of the turbine house, together with both roofs. The building has been widened in a westerly direction to about double its original size, and the new turbine house has been reconstructed to the same width but with increased height. The new turbine room, which is to be equipped with two 20,000-kW Brush Ljungström turbo alternators, is aligned with the portion of the original turbine house which is still in use with its two 5,000-kW sets. The new boiler house, with its four 120,000-lb per hour Babcock & Wilcox boilers, is partly aligned with the corresponding portion of the original boiler house which has a plant capacity of 160,000 lb (72,600 kg) per hour. The old buildings and plant will later be replaced by a duplication of the power station now under construction to comply with the 1952 programme. Ultimately the station will have a total capacity of 80,000 kW.

The general construction of the buildings is steel framing with brick filling and artificial stone dressings. Because of the peaty nature of the site, piling had to be carried out down to the ballast for all the buildings, and the average length of the piles employed is 27 ft (8·2 m). The piles, plant and building foundations were all constructed of ciment fondu because of the amount of acid in the water from the peat. Water exists 5 ft (1·5 m) below ground level, so that the construction of the buildings and foundations entailed very extensive pumping.

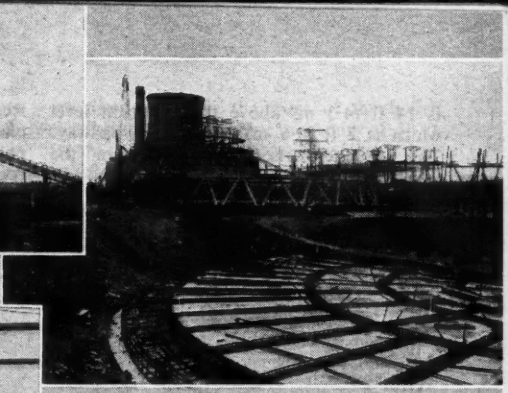
Layout of Buildings

The triangular site between the railway and the river is about 1,670 ft (509 m) long at the river frontage, and about 540 ft (165 m) wide at the east end, i.e., from the river to the railway. The main boiler house and turbine house building, which measures about 116 ft (35·4 m) by 174 ft (53 m), is situated about 330 ft (100·6 m) from the river and railway junction. Immediately inside the site at the north is a system of sidings from the railway, and at a point on the sidings about 850 ft (259 m) from the railway and river junction is the discharge point to a conveyor system rising direct to the boiler house bunkers. About a quarter of the site at the north-east corner will be a coal store of some 30,000 tons capacity.

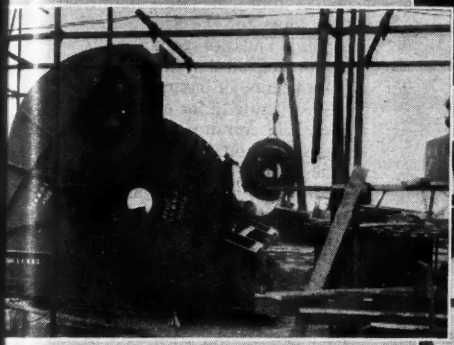
Aligned east and west along the south boundary of the site at the east end four 500,000-gallons (2,273,000-litres) per hour cooling towers are under erection. The summer flow of the river is very small and it has been necessary to include cooling towers in the scheme for use with the river to provide the circulating water required. It was originally proposed to provide one cooling tower of 2 million gallons (9,092,000 litres) per hour capacity for the two machines, but as a limitation of 90 ft (27·4 m) was determined by the Electricity Commissioners at the inquiry in 1944, it was necessary to restrict the capacity of each tower to 500,000 gallons per hour. The present work includes four towers of Mouchel & Partners design, additional towers being required for the 1952 programme. In the 500-ft (152-m) stretch between the coal store and cooling towers at the east end and the main buildings at the west end are the grid substation at the north and the new switchhouses and circulation-water pump house.

It is logical to follow the above outline of the lay-out of the site with a few sketch lay-outs of some of the major components. The boiler house, for instance, measures about 121 ft (36·9 m) wide by 116 ft (35·4 m) long, i.e., south to north, and 74 ft (22·6 m) high from the basement level. The firing-floor

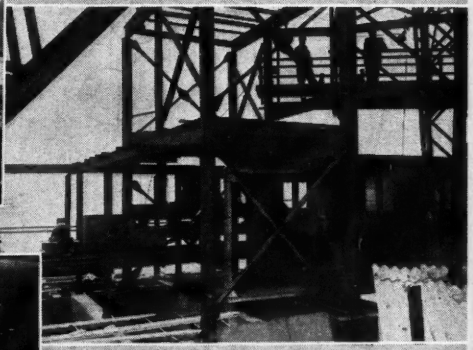
From a point 850 ft from the railway and river junction a conveyor rises to the boiler house bunkers



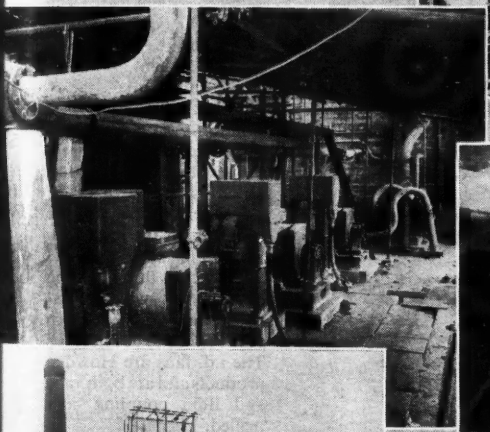
Four 500,000-g.p.h. cooling towers are being erected at the east end of the site



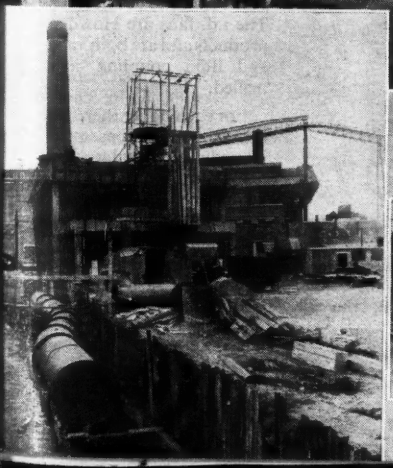
Each boiler has its I.d. fan at roof level; a vane control unit is being assembled in the rear



Above the boiler bunkers the main conveyor will discharge to a shuttle conveyor

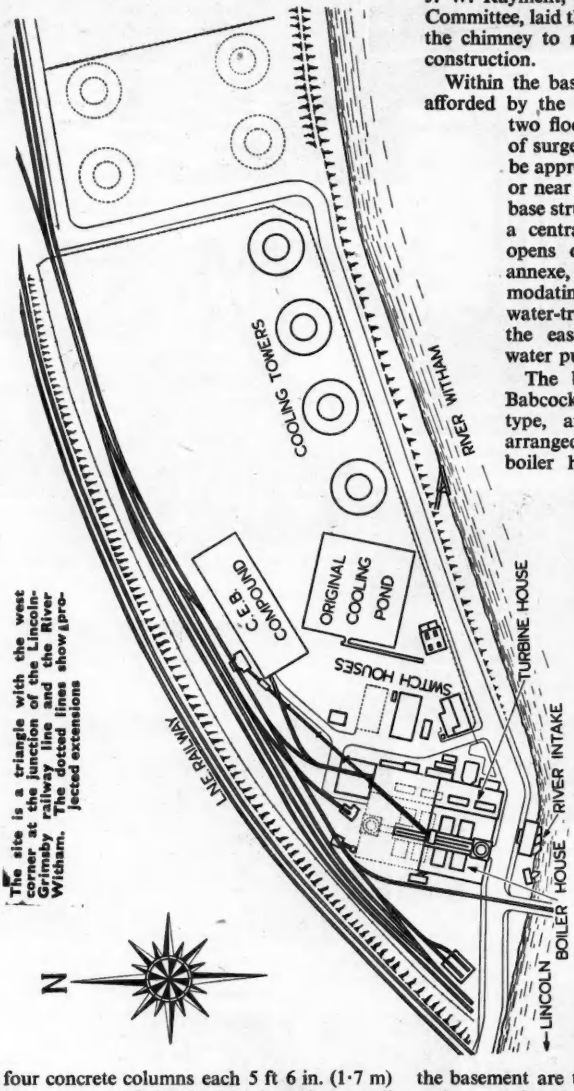


The feed pumps are accommodated in one of the annexes from the entrance "hall" (above left). Work is well advanced with the paddle ash equipment of the ash-handling system



Above: The electrical ends of the first 20,000-kW turbo-alternator are about complete. Left: From the pumping station to the east of the main building a 48-in. main will deliver the circulating water to the cooling towers

is 14 ft (4·3 m) above the basement level which is 2 ft (0·6 m) below the roadway. The chimney rises centrally from the south end of the boiler house and stands on four concrete columns each 5 ft 6 in. (1·7 m) square and 74 ft (22·6 m) high. The overall height of the chimney is 225 ft (68·6 m).


The site is a triangle with the west corner at the junction of the Lincoln-Grimsby railway line and the River Witham. The dotted lines show projected extensions
COOLING TOWERS
RIVER WITHAM
C.E.B. COMPOUND
ORIGINAL COOLING POND
SWITCH HOUSES
TURBINE HOUSE
RIVER INTAKE
BOILER HOUSE
LINCOLN
LINE RAILWAY
N

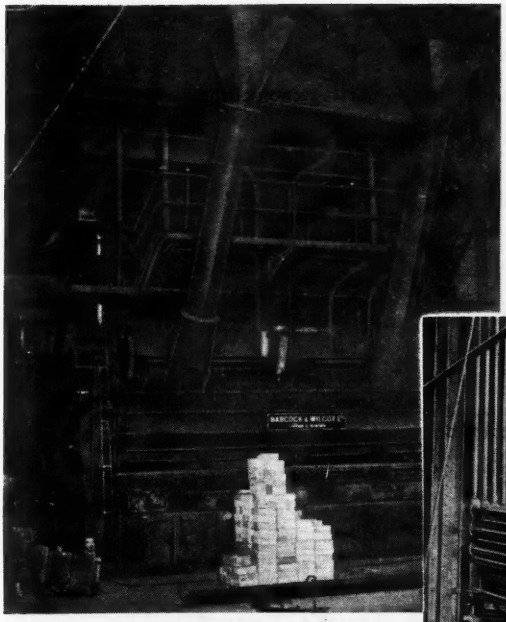
Readers may recall that this limitation was placed upon the chimney as a result of a public inquiry. Our visit to the power station coincided with a ceremony at which Alderman J. W. Rayment, chairman of the Electricity Committee, laid the last "dog" at the top of the chimney to mark the completion of its construction.

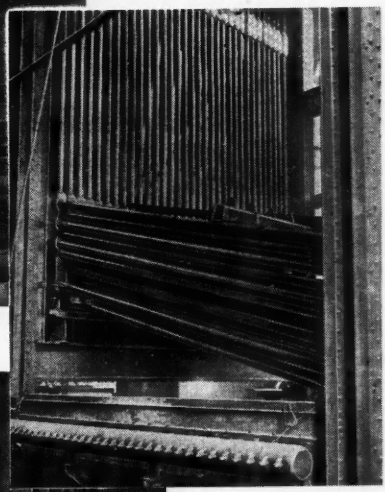
Within the base structure of the chimney afforded by the four concrete columns are two floors for the accommodation of surge and storage tanks. It will be appreciated that at ground level, or near enough basement level, the base structure of the chimney forms a central entrance "hall" which opens out on each side to an annexe, that on the west side accommodating the evaporators and water-treatment plant, while that on the east side houses the feed-water pumps.

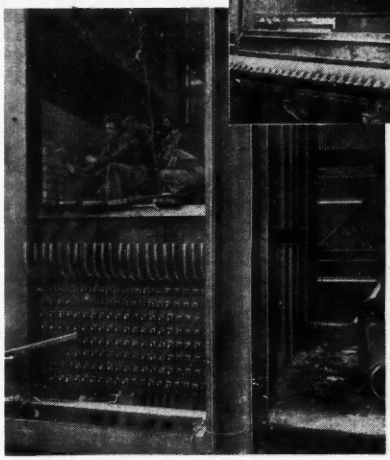
The boilers, which are of the Babcock & Wilcox, Ltd., high-drum type, are stoker fired, and are arranged two on each side of the boiler house, with facing fronts. Between them are the overhead coal bunkers which rise to a top level of some 10 ft (3 m) above the roof of the boiler house. The i.d. fan for each boiler is on the boiler house roof immediately above the economizer, which is at the back of the boiler and to which it connects on the inlet side. The outlet side is joined directly to a flue trunking on the roof which communicates with the bottom of the chimney at this level. The i.d. fans are Howden products and are both vane and fluid coupling controlled.

For each boiler there is a f.d. fan in the basement immediately under the front of the boiler, and two secondary-air fans at the back of the boiler at the firing-floor level. Also in the basement are the paddle ash equipment and conveying belts for the ash-handling system, the whole of which is in a well-

advanced stage of construction. The main assembly on two of the boilers is practically complete, and we saw work proceeding in the assembly of the boiler sections and economizer sections on the other two units.







Two of the boilers are almost completely assembled, while in the other cases we saw various stages of assembly of the boiler and economizer sections and tubes

The boiler units have the drums situated at 45 ft (13·7 m) above the firing floor. Each boiler has 33 sections of 8 tubes, the mean height of the circulating tubes from the firing floor is 22 ft (6·7 m) at the back, rising to 27 ft (8·2 m) at the front, giving a very generous combustion space. The superheater tubes are disposed above the front of the boiler circulating tubes at a mean height of 36 ft (11 m) above the firing floor. The economizer is situated behind the boiler unit and has 22 sections each of ten tubes. Each boiler is designed for the following operating conditions:—Normal evaporation, 100,000 lb (45,360 kg) per hour; m.c.r., 120,000 lb (54,430 kg) per hour; pressure at superheater outlet, 425 lb per sq in. (29·9 kg per cm²); temperature at superheater outlet, 825 deg F (440 deg C).

A new 100-tons-per-hour Babcock & Wilcox coal-handling system serves a shuttle conveyor, installed over the boiler bunkers, which is designed to discharge into either of the two main bunkers, each of which serves a pair of facing boilers. At present there is a considerable overhang of the shuttle conveyor which has been designed to provide for the coal bunkers in the 1952 extension.

The turbine house measures about 116 ft

(35·4 m) long, 48 ft (14·6 m) wide and 60 ft (18·3 m) high inside. The turbine-floor level is 18 ft (5·5 m) above that of the basement which is level with the boiler house basement. The two 20,000-kW turbo-alternators are to be erected in line longitudinally along a central line 18 ft (5·5 m) from the west wall of the turbine house. At the time of our visit the electrical portion, i.e., the alternator sections at each end of the set, were completed, but the turbine was awaiting the blading. The turbine has 35 stages and is bled at two points. Two 60 per cent duty circulating pumps are provided for each machine and duplicate extraction pumps have been installed.

We took the opportunity of making a very rough comparison of the floor-space dimensions of the new 20,000-kW set and one of the old 5,000-kW sets. Including in both cases all projections at floor level, the new set measures 39 ft (11·9 m) long and 15 ft (4·6 m) wide, while the old set measures 27 ft (8·2 m) long and 12 ft (3·6 m) wide. The feed heaters are mounted on a sub platform about 8 ft (2·4 m) below the operating floor, and the space for these and other equipment such as the extraction pump, valves, etc., around the condenser is rather limited and has consequently called for considerable ingenuity in the lay-out.

On the east side of the turbine house a gallery 4 ft (1·2 m) above the turbine operating floor now accommodates the control board for the main switchgear for the alternators and the main outgoing feeders. The switchgear is of Ferguson, Pailin manufacture and has a rupturing capacity of 500,000 kVA. It is housed in a separate switchhouse about 80 ft (24·4 m) east of the turbine house, and its two sections are separated physically one on each side of a bus-bar coupler. In a separate section of the switchhouse is a local control board to facilitate maintenance and also accommodate overload and other relays, but the operations will normally be effected from the control board in the turbine house.

For the circulating water intake a rotary-screen house is under construction at a point immediately south of the boiler house. This will accommodate three 12-ft (3·6-m) diameter Ledwood & Beckett screens with a 72-in. (1·8-m) intake to the station and a 48-in. (1·2-m) branch to the section pits for the two machines.

From the discharge side of the two condensers a 48-in. main links with the pump house which is being erected some 200 ft (61 m) east of the turbine house in which there will be installed two Foster Gwynne one million gallons (4,546,000 litres) per hour pumps which will deliver the water to four cooling towers.

The station was designed by Mr. Newey and his staff with L. G. Mouchel & Partners, Ltd., as civil engineering consultants.

South Australian Trust's Report

WE have received from Mr. W. E. Lane, London manager, a copy of the first report of the Electricity Trust of South Australia. It covers ten months from 1st September, 1946, when the Trust took over the undertaking of the Adelaide Electric Supply Co., Ltd. Appreciation is expressed of the work for the industry of the late Mr. F. W. H. Wheadon, chief engineer and manager, in recognition of which it was decided that a bronze memorial tablet should be erected in the engine room of the new Osborne " B " power house.

The Osborne " B " station started generating on 16th April last since when it has been supplying about 30 per cent of the system demand, with an appreciable effect in improving the overall efficiency. Orders were placed for an additional C. A. Parsons turbo-alternator similar in design to the first two, and a fourth Babcock & Wilcox boiler in which will be incorporated a spreader stoker designed to burn either Leigh Creek or Newcastle coal. Tenders have also been called for two further boilers. This plant will complete the first half of the station. The question of South Australian power requirements after 1952 has been under consideration and the desirability of establishing a regional power station in the north to burn Leigh Creek coal has been investigated.

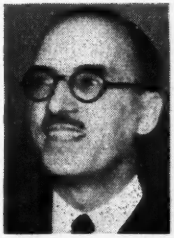
On the distribution side, the proposed change-over from 210 to 240 V was postponed indefinitely owing to shortages of labour and materials. Because of coal shortage at Osborne it was necessary from time to time to restrict the use of electricity for various purposes. To meet such conditions it was decided to install oil-burning equipment at Osborne " A " station at a cost of about £20,000, but it is pointed out that the higher cost of oil must confine its use to emergencies. At to-day's prices the use of oil, even as an auxiliary to coal, means an additional ¼d. per kWh on the cost.

Sales during the ten months amounted to 225·9 million kWh, an increase of 20 per cent on the corresponding period of the previous year, and revenue rose by £186,678 to £1,502,191, the average price per kWh sold being 1·59d. (against 1·67d.). After providing £324,510 for interest, £20,000 for rural development reserve, £16,000 for contingency reserve and £1,250 for new capital charges, there was a balance of £5,567 on net revenue account.

New Year Honours

Knighthoods for Mr. de Ferranti and Dr. Cockcroft

THE two outstanding electrical personalities in the New Year Honours List published last week are MR. V. Z. DE FERRANTI, M.C., chairman and managing director of Ferranti, Ltd., and past-president of the Institution of Electrical Engineers, and DR. J. D. COCKCROFT, M.I.E.E., F.R.S., known internationally for his work on atomic research, Director of the Atomic Research Establishment, Ministry of Supply. Both of these gentlemen have had knighthoods conferred upon them.



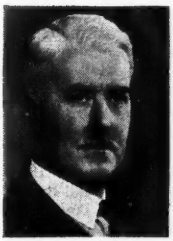
LORD HYNDLEY, G.B.E., chairman, National Coal Board and lately Controller-General, Ministry of Fuel and Power, becomes a viscount, and SIR VALENTINE GEORGE CRITTALL, J.P., chairman and managing director of the Crittall Manufacturing Co., Ltd., is created a baron.

Three new knights. Top: Mr. V. Z. de Ferranti. Left: Dr. J. D. Cockcroft. Right: Dr. R. V. Southwell.

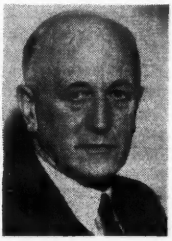
In addition to the two knighthoods already referred to, the list includes COL. E. GORE BROWN, lately chairman of the Southern Railway Co., MR. H. CLAUGHTON, C.B.E., M.A., Principal of the University of London, MR. P. B. JOHNSON, president of the Engineering and Allied Employers' National Federation, MR. C. G. RENOLD, J.P., chairman of the Renold and Coventry Chain Co., Ltd., DR. H. R. RICARDO, LL.D., F.R.S., chairman and technical director of Ricardo & Co., Ltd., MR. R. NESBITT-HAWES, Director-General, Posts and Telegraphs, Burma, MR. N. F. FROME, M.I.E.E., chief engineer, Posts and Telegraphs, India, and DR. R. V. SOUTHWELL, F.R.S., Rector of the Imperial College of Science and Technology, University of London.

MR. B. L. BARNETT, M.C., Director of Inland Telecommunications, G.P.O., becomes a Companion of the Bath, MR. C. H. BRAZEL, M.C., Chief Engineer and Manager, Department of Government Electrical Undertakings, Ceylon, has had the C.M.G. conferred upon him, and SIR ERIC CHARLES MIEVILLE, K.C.I.E., K.C.V.O., C.S.I., C.M.G., Principal Secretary to the Viceroy of India and a director of the India Rubber, Gutta Percha & Telegraph Works Co., Ltd., becomes G.C.I.E. The C.I.E. is conferred on LT. COL. R. W. SPEAR, O.B.E., Senior Deputy Director-General, Posts and Telegraphs, India, and COL. (temporary Brigadier) G. D. YOUNG, O.B.E., M.C., Brigadier, Electrical Mechanical Engineering (Headquarters, Southern Command), India.

In the list of those who receive the C.B.E. are the following :—MR. G. L. H. BROUGH, M.I.E.E., Deputy Director of Electrical Engineering, Admiralty, MR. E. G. CLARK, M.C., M.Inst.C.E., secretary, Institution of Civil Engineers, MR. H. E. COLLINS, M.Eng., M.I.Min.E., A.M.I.E.E., for services as Director, Production Branch of the Coal Group, Control Commission for Germany (British Element), MR. F. A. KING, joint managing director of Kelvin & Hughes, Ltd., MR. G. H. TAYLOR, Deputy Regional Director, London Tele-



Mr. E. G. Clark (C.B.E.)



Mr. G. H. Taylor (C.B.E.)

Mr. C. T. S. Arnett (O.B.E.)

Mr. A. J. Ryan (M.B.E.)

communications Region, G.P.O., MR. D. L. WALKER, general secretary of the Federation of British Industries, and MR. N. THORNTON, Punjab Service of Engineers, Chief Engineer and Secretary to the Government of the Punjab in the P.W.D., Electricity Branch.

Among those who are awarded the O.B.E. are MR. C. T. S. ARNETT, M.I.E.E., Manager of the North-West England and North Wales Area of the Central Electricity Board, MR. J. N. HILL, M.I.E.E., Telephone Manager, South East Area, London Telecommunications Region, G.P.O., MR. S. R. NEVILLE, managing director of British Ropes, Ltd., MR. C. G. PHILLIPS for services as Assistant Director of Telecommunications, Ministry of Civil Aviation, MR. E. G. PHILLIPS, M.I.Mech.E., M.I.E.E., chairman of the North Midland Regional Fuel Efficiency Committee, MR. W. G. POOLE, works manager of W. H. Allen Sons & Co., Ltd., Bedford, MR. J. P. JEFFCOCK, M.I.E.E., Deputy Director-General, Civil Aviation (Airways and Administration), Government of India, and MR. F. J. TOONE, managing director, Parmeko, Ltd.

The M.B.E. has been conferred upon the following:—MR. A. E. ADAMS, chief designer of Scophony, Ltd., MR. W. R. DUNCAN for services as production superintendent, David Brown & Sons (Huddersfield), Ltd., MR. L. I. FARREN, technical assistant, General Electric Co., Ltd., MR. N. W. I. JONES, A.M.I.E.E., chief d.c. designer of Mawdsleys, Ltd., Dursley, MR. H. RAINFORD, senior experimental officer, Electrical Testing Station, Buxton, Ministry of Fuel and Power, MR. A. J. RYAN, M.I.E.E., A.M.I.Mech.E., lately chief electrical and mechanical engineer, Corporation of Hastings, MR. R. R. WHYTE, A.M.I.Mech.E., assistant superintendent, Gas Turbine Department, Metropolitan-Vickers Electrical Co., Ltd., MR. H. WOLFSON, senior research chemist, Valve Research Laboratories, Standard Telephones & Cables, Ltd., MR. A. J. CROCKER, Controller of Telecommunications, Newfoundland, and MR. S. B. GWYNN, Divisional Engineer, Wireless, Burma.

The British Empire Medal has been awarded to MR. A. H. CROXON (Elliott Bros. (London), Ltd.), MR. R. DAVIES (British Insulated Callender's Cables, Ltd.), MR. H. ELLISON (B. S. & W. Whiteley, Ltd.), and MR. G. GREENHOUSE (General Electric Co., Ltd.).

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE British Electricity Authority is inviting applications for posts of deputy commercial managers (£2,500-£3,000) and assistant commercial managers (£1,500-£2,000). Candidates are required to have held responsible positions and have had wide experience in the commercial, technical and economic aspects of electricity supply.

Mr. John O. E. Steele, staff adviser to Central London Electricity, Ltd., has been appointed welfare officer by the British Electricity Authority. Mr. Steele, who was educated at Dover College, was a schoolmaster before joining the Kensington & Knightsbridge Electric Lighting Co. in 1934 as assistant secretary. He later became staff control officer with Central London Electricity, Ltd., and during the war he served with the Duke of Wellington's Regiment and at the War Office on the General Staff. Mr. Steele is thirty-eight.

Mr. J. O. E. Steele

Mr. H. Cousins, publicity manager of the British Aluminium Co., Ltd., will be retiring at the end of January after completing forty years' service with the company. As a consequence, the Publicity Department is being combined with the Sales Research and Statistical Section under **Mr. C. G. McAuliffe** as manager. **Mr. E. G. Fielding,** publicity officer, will be responsible for the publicity work of the new Publicity and Sales Research Department.

Mr. S. Ferguson, founder of the present business of Cooke & Ferguson, Ltd., has relinquished his appointment as managing director but will continue to be chairman. **Mr. J. R. Ferguson,** who has been associated with his father for many years, has been appointed general manager of the company as from 1st January.

Mr. E. J. Strickland, assistant traffic manager to C. A. Parsons & Co., Ltd., retired at the end of December at the age of seventy. He had been with the company for forty years.

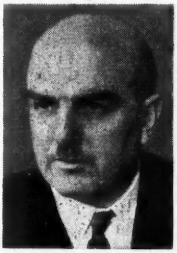
We are very sorry to hear that **Sir Arnold Gridley,** M.P., director of the Lancashire Electric Power Co. and other companies, was involved in a car accident last Friday. He was taken to the Horton General Hospital, Banbury, with facial injuries and a fractured jaw and later removed to a nursing home in Oxford.

Mr. C. W. H. Glossop has resigned from the boards of the Yorkshire Electric Power Co. and associated companies on leaving England for South Africa.

Mr. W. S. Procter, M.I.E.E., F.R.S.E., telephone manager, Glasgow Telephone Area, has been appointed chief regional engineer, London Telecommunications Region. He became tele-

phone manager at Glasgow in February, 1945. Mr. Procter is the joint author of the standard text book "Telephony," as well as being the author of several other text books on the subject.

Mr. G. W. Giffin, M.B.E., general works manager of the factories at Woolwich, Spennymoor and West Hartlepool, of Siemens Bros. & Co., Ltd., has been appointed a director of the company. He has also recently joined the board of Submarine Cables, Ltd., an associated company of Siemens Bros. Mr. Giffin joined the company in 1939 and became manager of the cable factory two years later. In 1942 he also took over the production of telephone apparatus and other manufactures at Woolwich, and subsequently the establishment of its new factories in the North East England area.



Mr. G. W. Giffin

Mr. Percy M. Maxwell, who recently retired from the position of borough electrical engineer of Batley, has been presented with a radio set by the Electricity Department staff.

Mr. J. W. Bell, who since 1915 has managed the Newcastle-on-Tyne office of Gent & Co., Ltd., Faraday Works, Leicester, retired at the end of the year after forty-three years' service. He is succeeded by **Mr. W. H. Skinner,** who has been his assistant since 1920.

Mr. W. L. Fraser, C.M.G., has been elected a director of Tube Investments, Ltd., and has been appointed a deputy chairman. **Sir Edmund Crane** has resigned from the board, before leaving the country for a visit to South Africa.

We are sorry to learn that **Mr. G. N. Green,** borough electrical engineer, of Peterborough, is shortly to enter hospital for an operation and we wish him a speedy recovery.

Mr. T. P. Everett, until recently manager of the Land Department of the Hartlepool works of Richardsons Westgarth & Co., Ltd., has been appointed a director of the company. **Mr. B. B. Wyatt** has been appointed manager of the Land Department in succession to Mr. Everett. **Mr. W. E. Loveridge** will continue as resident director in charge of the Hartlepool works.

Mr. R. S. Portham, M.I.E.E., has retired from the board of the Superheater Co., Ltd.

Mr. F. H. Shepherd, assistant charge engineer, Oldham, has been appointed charge engineer at Accrington Corporation's electricity generating station.

Mr. F. R. Gilks, A.M.I.E.E. has been appointed assistant electrical engineer to Leek Urban District Council as from 1st February. Mr. Gilks served an apprenticeship with the Electrical Equipment Co., Ltd., and received his technical training at the Leicester College of Technology and Commerce. After a student course in Leicester Electricity Department he held positions in the Department until 1944 when he joined the English Electric Co., Ltd.

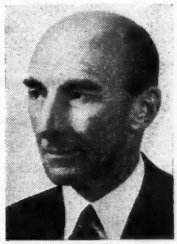
Mr. H. Leaver is recommended for the position of acting deputy electrical engineer, Burnley, to succeed Mr. T. Riley who was recently appointed acting electrical engineer. He has been with the undertaking for thirty-six years and latterly has held the post of mains superintendent and consumers' engineer. **Mr. J. T. Fletcher,** senior mains superintendent, becomes mains superintendent and consumers' engineer.

We are glad to hear that **Mr. F. G. Ticehurst,** A.M.I.E.E., is now convalescent after his recent serious illness and hopes to resume normal activities in a few weeks' time.

Mr. A. G. Bell, assistant power station superintendent, Coventry, has been appointed superintendent of the Wallasey generating station, in succession to the late Mr. E. B. Pausey. The position carries a commencing salary of £680 per annum.

The members of the Railway Executive Committee, under the chairmanship of **Sir Eustace Missenden** (formerly general manager of the Southern Railway) also include **Mr. J. C. L. Train** (civil engineering and signalling) and **Mr. R. A. Riddles** (mechanical and electrical engineering).

Mr. C. M. Cock, who has been appointed chief electrical engineer to the Railway Executive Committee of the British Transport Commission, was formerly chief electrical engineer to the Southern Railway. An Australian (born in Melbourne) Mr. Cock received his early engineering training at the Newport Carriage and Wagon Workshops of the Victorian Railways. During the 1914-18 war he served in the Royal Navy. He joined Merz & McLellan in 1919 and worked as personal assistant to the late Mr. E. P. Grove, the firm's chief resident engineer on the electrification of the Melbourne suburban lines of the Victorian Railways, and the construction of the Newport "B" power station of the Victorian Electricity Commission. In 1924 he went to India as one of Merz & McLellan's supervising engineers on the electrification of the G.I.P. Railway suburban lines and main lines to Poona and Igaturi, and the B.B. & C.I. Railway suburban lines. In 1929 he joined the G.I.P. Railway and held



Mr. C. M. Cock

various appointments up to divisional engineer for the area including Bombay. During the war he was "lent" for a time to the Royal Indian Navy and served afloat as lieut.-commander until he was recalled to his railway duties. In 1945 he was appointed deputy to Mr. A. Raworth, chief electrical engineer to the Southern Railway, whom he succeeded later the same year. Last year Mr. Cock was elected to the Council of the Institution of Electrical Engineers, and he is also a member of the Transmission Section Committee.

Mr. W. D'Arcy Madden, chairman and managing director of Hick, Hargreaves & Co., Ltd., has been appointed to the North West Regional Board for Industry.

Mr. M. T. Durham, A.M.I.E.E., at present district mains engineer with the N.W. Midlands J.E.A., has been appointed deputy distribution superintendent with the Croydon Electricity Department as from 2nd February. Mr. Durham was previously with the East Anglian Electricity Supply Co. and the Yorkshire Electric Power Co.: he joined the J.E.A. in 1939.

Mr. H. G. Allen, who has been manager of the Birmingham branch of Falk, Stadelmann & Co., Ltd., since 1937, has been appointed to the board and is returning to London to take up an executive post. **Mr. R. A. Stenning,** assistant manager, has been appointed manager of the Birmingham branch.

Mr. John K. Dent, assistant mains engineer with the Ayrshire Electricity Board, Kilmarnock, has been appointed deputy district distribution engineer with the Uxbridge & District Electric Supply Co., Ltd.

The head office and factory staffs of Thorn Electrical Industries, Ltd., held their Christmas dance at the St. Pancras Town Hall on 23rd December. The festivities included competitions for a Ferguson radio set and a baby carriage. The managing director, Mr. Jules Thorn, introduced Mr. John Belcher, Parliamentary Secretary to the Board of Trade, who expressed his belief that the country had now passed through the worst trials of the post-war period.

The Ekco Players are presenting "Aladdin and his Ekco Lamp" for one week from 19th to 24th January in the works canteen at Prittlewell. Three performances are being given for Ekco Social and Sports Club members and the remaining four, including a Saturday matinee, for various charities.

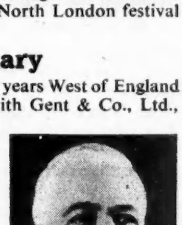
The Sports Club, associated with the head office and Birmingham branch of Electrical Components, Ltd., wound up a successful year's activities with its first Christmas party since the war, at the Imperial Hotel, Birmingham, on 22nd December. The dinner was followed by a cabaret and dancing.

The A.S.E.E. West London Branch held a dinner and dance at the Clarendon Restaurant, Hammersmith, W., on 3rd January, when a past-chairman's certificate was presented to Mr. E. J. Sutton, M.I.E.E., now chairman of the Association, and a presentation was made to the Branch secretary, Mr. J. H. K. Pendry. Mr. J. Flood, the Branch chairman and a past-chairman of the Association, presided. Mr. L. R. Perkins, vice-chairman of the Association, presented the certificate to Mr. Sutton, and the general secretary, Mr. A. Brammer, presented Mr. Pendry with an engraved silver cigarette case as a mark of the members' appreciation of his work. Mr. E. R. Wilkinson, M.I.E.E. (past-president) replied to the toast of the guests.

The Pirelli-General Choir (conductor, Mr. F. Stamper) broadcast a programme of unaccompanied part songs on the B.B.C.'s West Regional wavelength on 28th December. This was their fourth broadcast. The choir has gained first prizes at the Southampton, Bournemouth and Portsmouth competitive festivals, and are the present holders of the challenge shield won in the "open" class at the North London festival last May.

Obituary

Mr. W. Corton, for many years West of England technical representative with Gent & Co., Ltd., died at his home in Leicester on 19th December at the age of seventy-four. He had been in the service of the company for fifty-four years and was well known in technical circles in the West Country, South Wales and the Midlands. Until October last he regularly attended meetings at the British Standards Institution in London; he was a member of the sub-committee dealing with intrinsically safe apparatus. Mr. Corton was prevented through ill-health from taking office on his election as president of the Leicester Association of Engineers, of which body he had been a member for many years. He leaves a widow and one son.



The late Mr. W. Corton

Mr. A. E. May.—The death occurred on 29th December, at the age of sixty-two, of Mr. A. E. May, chief electrician to the Sheepbridge Coal & Iron Co.

Will.—Mr. E. E. Jolly, borough electrical engineer, Bethnal Green, left £7,973 (net personalty £7,078).

Purchase Tax on Immersion Heaters

IT was announced on Tuesday that in future immersion water heaters with a loading of less than 4 kW will be regarded as chargeable with purchase tax. Hitherto the tax has applied only to those not exceeding 3 kW.

Views on the News

Reflections on Current Topics

IT was rather sad to read in last week's *Electrical Review* that Chester is considering the closing-down of its hydro-electric plant because it is not paying its way. There is a fascination about all power plant but most water-power undertakings are particularly attractive. They also save coal or oil and so strict finance is not the sole consideration nowadays. Apart from the larger concerns in Scotland and North Wales there are between thirty and forty authorized undertakings with small hydro plants; these are largely in Scotland, Devon and Wales, although those at York (Linton) and Worcester (Powick) are possibly the best known. The Electricity Commissioners' returns for 1946 credited the River Dee works, Chester, with an output of 1,238,000 kWh, which was larger than the production of most of the small water-power schemes.

* * *

I am sure that all my readers will appreciate and applaud a recent decision of Judge Lawson Campbell at Luton County Court. A landlady sought possession of a house from tenants who had had electricity installed and she offered as alternative accommodation a house in which only gas was available. The Judge refused to grant an order, holding that it was "perfectly hopeless" for a woman accustomed to using electrical appliances to move into a house supplied only with gas.

* * *

The extent to which self-denial on the part of domestic consumers has contributed to relative freedom from load shedding so far this winter has been obscured by the high temperatures that have been experienced. Records for the past five years kept at North-met House show the half of the heating season, started on 1st October last and terminated with the old year, to have been exceeded in the number of degree-days only by the latter part of 1945. It has to be remembered, however, that the sustained very cold period of last winter did not begin until 23rd January. Up to the end of 1946, outside temperatures during the heating season were about equal to those of corresponding periods in two other years.

Examination of the data given by Mr. R. Grierson in his Mechanicals paper of 1945, which the author has now brought up to date, does not suggest the probability of a return of such extreme conditions. Nevertheless the need to exercise vigilance in regard to the use of domestic appliances between 4 and 6 p.m., and to a lesser extent between 8 and 10 a.m., will remain for three months.

* * *

According to the *Daily Express*, the teredo has started to eat Shoreham Harbour. Apparently this is not a single specimen (if it were the harbour would provide a meal for a very long time) but a brood of them, attracted or engendered by warm water issuing from the Brighton electricity works (or, as some say, the local gasworks). There seems to have been some doubt in the reporter's mind as to the nature of the pest. In his first paragraph he calls it a "wood-gnawing worm"; in his last "the bivalve mollusc." Funk and Wagnall, although giving "ship-worm" as one definition, quote an American authority as saying that "these creatures are not at all related to the worms, but are true mollusks." Whatever the teredo is it has proved a bane in the past to submarine cable engineers.

* * *

Much has been said in the last year or two on the theft of goods in transit but it is a trouble by no means confined to this country. Effective methods of combating this pilfering are not easy to find when opportunities are so plentiful, but I rather like some Brazilian importers' demand that all goods for them shall be packed in crates too heavy for two men to lift. Individuals may "get away with it" but a crowd attracts attention.

* * *

Much ado has been made about the recent refunds to undertakings supplied in bulk by the Yorkshire Electric Power Co., as a result of the Ilkley test case. In most cases the refund is, quite properly, being returned to the consumers in the form of discounts, but apparently some undertakings have had qualms regarding the wisdom of this in view of the "dissipation of assets" clauses of the 1937 Electricity Act. The point was whether the company would be permitted to pay out the amounts involved but now, apparently, the Ministry of Fuel and Power has given its approval and the air has been cleared.—**REFLECTOR.**

Area Electricity Boards

Minister Announces Appointments

LAST week the Minister of Fuel and Power made public the names of the members of the fourteen Area Electricity Boards set up under the Electricity Act, 1947. The names of the chairmen and deputy-chairmen had already been announced (*Electrical Review*, 5th and 19th December) as well as the composition of the London Board. Further appointments to the Boards and to the Consultative Councils provided for in the Act are to be announced shortly. There follows a complete list of the appointments so far made:—

South-Western Area.—Mr. S. F. Steward (chairman), Mr. H. Midgley (deputy chairman), Eng. Vice-Admiral Sir John Kingcome, K.C.B. (late engineer-in-chief, R.N.) and Mr. Frank Forrest (former city elecl. engineer, Birmingham).

Eastern Area.—Mr. C. T. Melling (chairman), Mr. H. C. Waters (deputy chairman), Capt. J. M. Donaldson (director, Northmet Power Co.) and Mr. W. J. Humphreys (Nat. Union of Engineers, Firemen, Mechanics and Elecl. Workers).

Southern Area.—Mr. H. Nimmo (chairman), Mr. R. R. B. Brown (deputy-chairman), Dr. H. G. Sanders (Professor of Agriculture, Reading) and Ald. J. P. D. Lacey (chairman, Portsmouth Elecy. Comtee., 1945-47).

East Midland Area.—Mr. C. R. King (chairman), Mr. J. Mould (deputy-chairman), Ald. A. Sturgess (chairman, Derby Elecy. Comtee.), Mr. G. H. B. Wilson (managing director, Raleigh Industries, Ltd.), Ald. A. Joyce (managing secy., Kettering Co-op. Society) and Mr. J. T. Graham (engineer and general manager, Worthington Simpson, Ltd.).

Midland Area.—Ald. W. Lewis (chairman), Mr. D. H. Kendon (deputy-chairman), Councillor A. Bennett (vice-chairman, N.W. Midlands J.E.A.), Capt. L. H. Green (vice-chairman, Hereford C.C.; agriculturist) and Mr. S. Burman (managing director, Burman & Sons).

South Wales Area.—Mr. L. Howles (chairman), Mr. E. Jones (deputy-chairman), Councillor I. R. Thomas (Rhondda U.D.C.), Ald. T. Evans (Glamorgan C.C.), Sir Gerald Bruce (chairman, Wales & Mon. Industrial Estates, Ltd.; Lord-Lieutenant of Glamorgan), Mr. B. Curran (Currans Engineering, Ltd.) and Prof. R. James (principal, S. Wales & Mon. School of Mines).

Merseyside and North Wales Area.—Mr. J. Eccles (chairman), Mr. D. P. Oliver (deputy-chairman), Mr. G. K. Paton (director, North Wales Power Co.), Ald. A. Hewitt (chairman, Llandudno Elecy. Comtee.), Mr. J. A. Duncan (chairman, Cheshire Branch, N.F.U.), Sir Arthur Pickup (former president of the C.W.S.) and Mr. A. O. Roberts (deputy-chairman, Liverpool Electric Power and Lighting Comtee.).

Yorkshire Area.—Mr. W. M. Lapper (chairman), Mr. D. Bellamy (deputy-chairman), Capt. A. W. Brown (area officer, Brit. Elecl. Development Association) and Mr. H. F. Sherborne (managing director, Yorkshire Copper Works).

North-Eastern Area.—Mr. H. H. Mullens (chairman), Mr. T. E. Daniel (deputy-chairman), Mr. C. I. C. Bosanquet (agriculturist; director of N.E.S. Co.) and Councillor Miss N. Balls (vice-chairman, Tynemouth Elecy. Comtee.; chairman, Newcastle Branch, E.A.W.).

South-East Area.—Mr. N. Elliott (chairman), Mr. W. R. T. Skinner (deputy-chairman), Mr. G. Humphreys (former area organizer, E.T.U.; member, London J.E.A.) and Ald. Simms (chairman, Brighton Elecy. Comtee.).

North-Western Area.—Mr. G. Gibson (chairman), Mr. R. A. S. Thwaites (deputy-chairman),

The Merseyside and North Wales Area Electricity Board

Left to right: Mr. J. A. Duncan, Alderman A. Hewitt, Sir Arthur Pickup, Mr. G. K. Paton, Mr. A. O. Roberts, Mr. D. P. Oliver (deputy-chairman) and Mr. J. Eccles (chairman)

Col. J. S. A. Walker (vice-chairman, North Western Industrial Estates, Ltd.), Ald. H. E. Rhodes (chairman, Preston Elecy. Comtee.) and Miss N. Kenyon (hon. sec., Manchester Branch, E.A.W.).

London Area.—Mr. H. J. Randall (chairman), Mr. E. A. Mills (deputy chairman), Mr. W. J. H. Wood (County of London E.S. Co.), Ald. I. J. Hayward (Leader, L.C.C.), Dr. P. Dunsheath (Henley's; past-president I.E.E.), Mr. W. A. Jones (former general secy., E.P.E.A.), Mrs. G. Dunbar (W.V.S.) and Mr. G. Eley (British Drug Houses, Ltd.).

South-East Scotland Area.—Sir Norman Duke (chairman), Mr. W. S. Sawtell (deputy-chairman), Mr. G. McLaren (convener, County of Stirling), Sir Ernest Wedderburn (Deputy Keeper of the Signet, Scotland) and Capt. R. J. Thompson (convener, Peebles County; recently chairman, Peeblesshire Agricultural Executive Comtee.).

South-West Scotland Area.—Mr. J. S. Pickles (chairman), Mr. W. Hutton (deputy-chairman), Mr. T. Murray (chairman, Ayrshire Elecy. Board), Col. J. G. Crabbe (convener, Dumfries C.C.), Mr. J. Miller (director, Albion Motors and Selfridges), Mr. J. B. Mavor (chairman, Mavor & Coulson, Ltd.) and Mr. G. Morgan (general manager, Glasgow Elecy. Dept.).

The first of the Area Boards to meet was the London Board; a photograph of the meeting appeared in our issue of 26th December. We reproduce on the opposite page a photograph taken at the first meeting of the Merseyside and North Wales Area Board.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

American Diesel Plant

IN "Radio Newsreel" on 30th December we heard that Vauxhall Motors, of Luton, had 5,000 kW of imported diesel plant running within nine months of the order being placed.

It is understood that this plant is American and if this is so, one wonders why dollars were allowed to be spent on it—unless, of course, the expenditure was worth while in view of the quick delivery, in which case it would appear the correct thing to repeat in large doses.

Opposition to this would no doubt come from various sources but this remedy of installing enough new American plant in say eighteen months to meet our immediate needs, which would otherwise not be met in another four or five years, would seem to release one stranglehold on our manufacturing industries.

SPECTATOR.

[The plant referred to is described on page 61 of this issue.—*Editors, Electrical Review.*]

Peak Load Control

IT is evident from the reduced steel allocation for the production of generating plant that the immediate post-war restrictions on electricity supplies will continue for some years, and therefore, the present temporary expedients of load shedding and industrial-load spreading will have to be reconsidered on a more permanent basis, with the object of achieving long term peak-load control, unless electrical development is to be seriously retarded for many years to come. Such peak-load control will also serve to improve load factor, a matter which should receive serious consideration under present-day restrictions.

One such temporary expedient, namely the use of air-raid sirens as an audible public warning to consumers to reduce their load, is receiving a good deal of attention at the moment. Whilst the results are stated to be satisfactory, and there is no reason to doubt this, the two great objections, namely the noise nuisance, together with its associated memories, and the fact that a given warning is effective only for a period of about half an hour, when it has to be sent out again, in this way multiplying the nuisance, mean that this method is likely to gain little favour with the public.

There seems no doubt, however, that the problem of peak-load control will have to be tackled by sending out a warning on our own distribution systems, either, for example, when there is central control, by means of a simple tuned buzzer on each consumer's installation, or a low-volt device, where conditions permit, which would operate a light buzzer until the desired reduction in load had been achieved. Alternatively, perhaps some form of "flashing" at each distribution substation might be possible, provided this did not cause unwonted interference.

Consumers have now become peak-load conscious, and experience suggests that they would be willing to co-operate effectively in such a scheme, on the understanding that

it would avoid future regular blackouts and would allow for reasonable development to continue. The question of how it should be done is largely a matter of economics, but that it will have to be done for a period of years seems certain. On the score of costs, the saving of peak-load charges would very soon justify the expenditure incurred.

We are going seriously into this question at Leyton, as we feel it is a problem which will be with us for very many years to come. We are fortunate in having centralized control, and the adoption of some form of tuned buzzer is being investigated.

*Leytonstone, E.*11. A. E. MORGAN,
Engineer and Manager,
Leyton Electricity Department.

Too Formal

A LETTER which I have received from the British Electricity Authority commences with the words "I am directed by the British Electricity Authority to thank you for . . ."

Such an introduction savours very much of the Civil Service and is hardly necessary. Surely the letter could have commenced "Thank you for . . ."

It is to be hoped the new Authority will maintain the traditions of the electricity supply industry even in such details as letter writing. "ONE OF THE INDUSTRY."

Rebates at Blackburn

I HAVE to call your attention to the comments given in your current issue with regard to a statement indicating that this undertaking has sent credit notes to members of the Blackburn Chamber of Commerce who have claimed a rebate on the maximum demand charge as a result of the fuel crisis in February last year.

The action taken by the undertaking in this matter has been in accordance with the recommendations made by the Electricity Commissioners and in the few isolated cases concerned, all negotiations have been carried out direct with the consumer.

Blackburn. R. H. HARRAL,
Engineer and Manager.

Inferior Exports

THE point made in your editorial columns last week is one which will command general agreement—the absurdity of allocating scarce materials for the production of shoddy goods. There may not, however, be the same support for your remedy, that the Government should step in to prevent this. Many of us feel there is quite enough bureaucratic interference in industry already without encouraging its malignant growth.

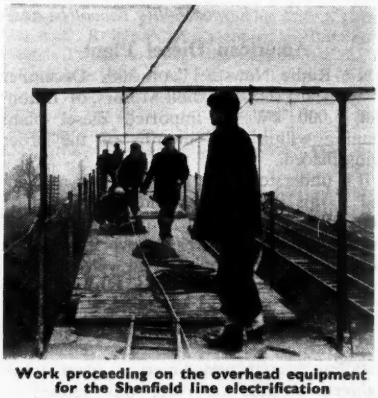
Surely a sounder remedy would be for industry to recognize its obligations to the community by setting up a proving house. This is where an independent body such as the British Electrical Development Association could give a lead.

Chislehurst, Kent. A. N. D. KERR.

[E.D.A., in conjunction with the British Standards Institution has already embarked upon a proving house scheme.—*Editor, Electrical Review.*]

Shenfield Electrification

WORK has now commenced upon the installation of overhead line equipment in connection with the scheme of electrification of the Liverpool Street — Fenchurch Street —



Work proceeding on the overhead equipment for the Shenfield line electrification

Shenfield Section line. In the accompanying picture we show men engaged in running out and attaching the auxiliary catenary to the main catenary.

Generating Plant at Wednesfield

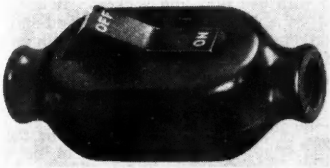
A SMALL ceremony marked the starting up of two McLaren-Brush diesel-electric generating sets, supplied by Associated British Oil Engines, Ltd., at the Wednesfield factory of the Yale and Towne Manufacturing Co. recently. The two sets, which were started by Councillor A. Guest of Wednesfield and Councillor J. Parkes of Willenhall, are now providing over half the electricity required to operate the machinery and to light the factory. The products of this factory, a large proportion of which goes for export, include chain blocks, hand trucks, portable cranes and a pull-lift which is used extensively in coal mines.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Line-cord Switch

A SINGLE-POLE line-cord through switch of 5 A at 250-V rating is announced by A.B. METAL PRODUCTS, LTD., Great South West Road, Feltham, Middlesex. The body is a substantial moulding and the snap action is unusual in that it is operated by a " see-saw " lever which



Lever-actuated through switch

is conveniently shaped for thumb depression. The on-off positions are clearly lettered and cord grips are provided to accommodate cable up to $\frac{3}{8}$ in. (95 mm) overall diameter.

Iron Connector

An addition to the range of products of ASHLEY ACCESSORIES, LTD., Morecambe Road, Ulverston, Lancs, is a moulded connector which can be quickly converted from top to side entry. The action of changing the cable protector from one position to the other automatically closes whichever entry hole is not used. The cord grip is a vulcanized fibre strip fixed with clamping screws which are quite distinct from those holding together the two halves of the casing. Double nickel-silver earthing strips are provided and the 7·5-A contact tubes are made of brass, not phosphor bronze.

Convertible iron connector

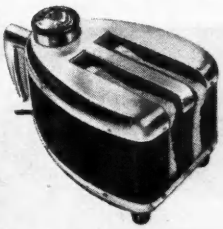
Transformer Accessories

The incorporation of mercury switches as arcing contacts in some types of on-load tap-changers manufactured by the BRITISH ELECTRIC TRANSFORMER CO. LTD., Hayes, Middx., minimizes burning of metal contacts. To facilitate occasional inspection the MDA type is now fitted with a small davit permanently attached to the cover to support it when opened and so avoid the use of tackle, an important consideration with outdoor transformers. The power unit for driving the tap-changer is enclosed in a weatherproof case with a hinged and removable cover; inside it is a plug socket for an inspection lamp after the unit itself has been isolated electrically.

There is also a new type of cable box incorporating a suspension system which relieves the porcelain through bushings from strain. The cable box is mounted on a disconnecting chamber of the horizontal type, giving easy access to the disconnecting links.

Automatic Toaster

An automatic toaster called the " Autoaster " which switches off the electricity when the desired degree of brownness has been reached is a new product of PERMOID, LTD., 56, Clerkenwell Road, London, E.C.1. Two slices are cooked on both sides, the time of cooking being regulated by means of an adjustable pneumatic plunger device. When the toast is done the spring mechanism which switches off the electricity simultaneously tilts the edge of the slices so that they can easily be picked out yet at the same time are kept warm till required. The first two slices take approximately 80 seconds to cook, subsequent slices not so long. Except for the plunger, which is of brass, the toaster is constructed of aluminium, with bakelite feet. The element is loaded at 800 W.



Permoid " Autoaster "

The same company is also making a light-weight vibrator for massage and beauty treatment. Both of these appliances are at present being reserved mainly for export.

Electro-plating Outfit

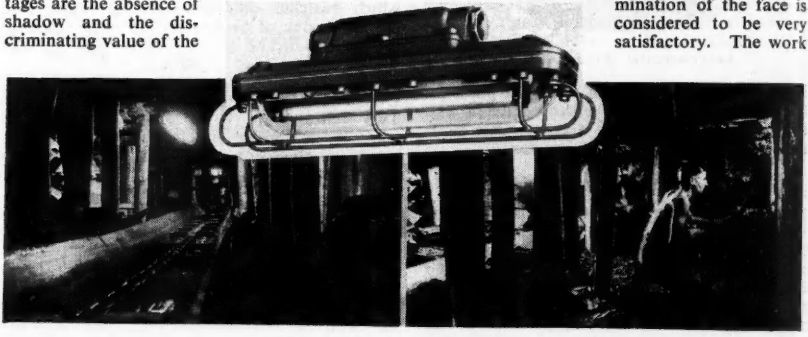
The small electro-plating outfit which is made under the trade name of " Wynall " by A. C. WITHNELL, LTD., Friars Lane, Richmond, Surrey, utilizes about 100 W, derived from a.c. 200-250 V single-phase mains through a transformer and selenium rectifier. The transformer and rectifier are housed in a ventilated sheet-steel cabinet; on its sloping front are mounted a mains switch and pilot lamp, two " Slydlok " fuses, current and voltage regulating knobs as well as a pair of indicating instruments.

Coal-Face Lighting

Experiments with Fluorescent Lamps

AT a recent press conference (see *Electrical Review*, 2nd January, p. 20) Lord Hyndley, chairman of the National Coal Board, referred to experiments at Chislet Colliery, Kent, in the illumination of the coal face by fluorescent lamps. This is the first of a series of nine experimental installations for a committee sponsored by the National Coal Board.

The installation has been carried out by the General Electric Co., Ltd., and it demonstrates that fluorescent lighting, by reason of its reduced intrinsic brilliance, is eminently suitable for the low mounting heights encountered at the coal-face. Other advantages are the absence of shadow and the discriminating value of the lighting as compared with tungsten lighting for the clean filling of coal.



Lighting of the conveyor and coal-face in Chislet Colliery. (Inset, one of the fittings)

The fittings, of an approved flameproof type, incorporate 15-W " Osram " fluorescent lamps measuring 18 in. (45·7 cm) long and 1 in. (2·54 cm) in diameter. For purposes of comparison some are fitted with twin lamps while others have only one. The coal seam varies in thickness between 3 ft (0·92 m) and 5 ft 9 in. (1·75 m) and the fittings, which are experimentally coupled in pairs by approved flameproof couplers, are suspended directly over the conveyor at intervals of approximately 5 yd (4·6 m). The whole installation is fed from an approved type gate-end box containing the contactor earth leakage trip and a transformer giving a 120-V supply.

The fittings incorporate chokes and starting switches—no capacitors are used—and are fitted with " Perspex " covers which provide a light spill axially with the tube. Tests have shown the durability of " Perspex " for this purpose. Means are provided for securing the cable at each end and provision is also made for earthing the pilot core to the earth core.

A screened cable is used with two power cores, a pilot and an earth core. An electrical interlock automatically cuts off current if the cable is severed or if a coupler or lamp is disconnected. The coupler was specially designed for the tests, but in order to extend its use to drill couplers when necessary, it is provided with five pins and sockets. It has been tested on a load of up to 30 A and has the outstanding advantage in that the earth core is continuous through the earth pin and sockets.

Despite the fact that the friable nature of the roof necessitates the use of an unusually large number of props, illumination of the face is considered to be very satisfactory. The work of " flitting " or changing the lamps as the coal-face advances takes two men two hours.

The installation has tended to show that two lamps connected by a plain cable do not give the same facilities for " flitting " as a single lamp. It has been suggested, therefore, that a coupler should be provided for each lamp.

Electrical Development in Cornwall

THE Cornwall Electric Power Co. has published a souvenir magazine which it has distributed to its employees. With the coming of nationalization, the undertaking, as a company, will cease to exist, and the magazine sets out the achievements of the company from its inception. In addition to matters relating to electricity supply, particulars are given of the company's social activities and there are messages from Mr. D. H. Kendon, former general manager, and from district managers of the company. A foreword is contributed by Mr. A. C. Owen the present general manager. Illustrations include plant installed at Hayle and some of the early plant at Carne Brea.

COMMERCE and INDUSTRY

B.I.F. Electrical Exhibitors.

MR. E. G. NESBITT (Simplex Electric) who, as we reported last week is the chairman of the resuscitated B.I.F. Electrical Exhibitors' Committee, tells us that the Committee has before it a considerable number of suggestions for improvements in matters affecting the Electrical Section of the Fair and these are being brought before the Management Committee. In the meantime Mr. Nesbitt or the secretary (Mr. A. H. Gambling, 36, Kingsway, W.C.2) will be glad to receive further suggestions from electrical exhibitors in the Birmingham and London Sections relating to improvements in the Electrical Section or the Fair itself.

Mr. Nesbitt says that in the past the Committee has been successful in obtaining improvements in publicity, transport, catering, cost of stand wiring, better representation of the electrical industry, the betterment of arrangements for visitors to the Fair, the provision of an exhibitors' club, etc. Although the secretarial arrangements are being undertaken by B.E.A.M.A. the Committee is not a B.E.A.M.A. organization; the members will be elected annually by the exhibitors whether members of B.E.A.M.A. or not. The Committee proposes to present its first annual report at a general meeting of electrical exhibitors to be held in Birmingham soon after the end of this year's Fair.

Paper for Advertising Circulars

The Board of Trade has issued the Control of Paper (No. 84) (Economy) Order, 1947 (S.R. & O. 2717) which reduces the quantity of advertising circulars which a person may distribute free of charge in any period of three consecutive months from 20 to 10 per cent of the weight so distributed in the corresponding period of the year ended 31st August, 1939.

British Exhibition at Copenhagen

An exhibition of goods of British manufacture will be held in Copenhagen from 18th September to 3rd October next. The King and King Frederik of Denmark have consented to become patrons of the exhibition, which is being organized by the British Import Union of Copenhagen in consultation with the Federation of British Industries, and with the approval of the British and Danish Governments. The aim of the exhibition, for which buildings in the centre of Copenhagen have been reserved, is to encourage export trade to the Scandinavian and neighbouring markets. It is intended that products of the engineering, chemical, building and associated industries will be displayed in the Forum Exhibition Building, the largest exhibition building in Copenhagen.

Companies wishing to take part in the exhibition are invited to make early application for space to the Exhibition Committee, the British Import Union, Raadhuspladsen, 45, Copenhagen, stating the kind of goods they wish to display and, where possible, the name of their agent in Denmark. Potential exhibitors can obtain further information from the British Import Union, Copenhagen, or from the London Office of the Copenhagen Exhibition, Earl's Court Exhibition Building, London, S.W.5. The manager on the British side is Mr. G. H. Meadmore, formerly secretary of the British Industries Fair, and on the Danish side, Mr. C. J. Marhauer.

Fostering Scandinavian Trade.

Industrial Clothing Coupons

The Board of Trade announces that the "Industrial Ten" clothing coupons supplement will be issued during the current rationing period. Employers should obtain application forms from the local office of the Ministry of Labour as soon as possible. The extra coupons will be issued to most manual workers in industry and agriculture, and the eligible jobs are very much the same as last year. The only important change in the scheme is that the number of hours to be worked each week in order to qualify will be reduced this year from 22 to 20. The procedure for obtaining the coupons is the same as before. Posters showing the list of eligible jobs and how to obtain the extra coupons have been issued to works and factories and can be seen at the local offices of the Ministry of Labour.

E.D.A. Annual Meeting

It has been decided to hold the annual meeting of the British Electrical Development Association at the Connaught Rooms, London, W.C.2, on Friday, 19th March. A buffet lunch will take the place of the usual annual luncheon.

Admiralty Research Establishment

The largest of the Admiralty research establishments, which under the name of the Admiralty Signal Establishment achieved world fame for its contribution to the development of radar, changed its name to the Admiralty Signal and Radar Establishment upon New Year's day.

Swedish Technical Journal

A new journal, " Acta Polytechnica," is being published in the English, French and German languages on a non-profit-making basis by the Royal Swedish Academy of Engineering Sciences in collaboration with a number of other institutions. It will contain nothing but selected original papers from establishments receiving grants in aid of research from the Swedish

Government and will be divided into five subsections devoted to mechanical, electrical and civil engineering, chemistry and metallurgy, physics and applied mathematics. It can be subscribed for (P.O. Box 5073, Stockholm, 5, Sweden) as a full series, one or more subsections, or UDC-numbers (universal decimal classification) concerned with particular subjects.

Employment in October

A rise in the numbers of insured persons employed in electrical engineering, wiring and contracting, and manufacture of electrical apparatus, cables, lamps, etc., is recorded by the latest statistics (for October) published in the December *Ministry of Labour Gazette*.

EMPLOYMENT DURING OCTOBER (THOUSANDS)

Branch	Males (14-65)			Females (14-60)			Total		
	Mid-1939	July 1947	Oct. 1947	Mid-1939	July 1947	Oct. 1947	Mid-1939	July 1947	Oct. 1947
Electrical engineering ..	105·9	105·9	107·1	28·0	50·6	50·3	133·9	156·5	157·4
Electrical wiring and contracting	38·9	47·2	53·1	2·8	5·6	5·7	41·7	52·7	58·8
Electrical apparatus, cables, lamps, etc.	116·4	139·7	147·6	79·5	132·3	137·8	195·9	272·0	285·4

At 10th November there were 1,691 persons (496 women) unemployed in the electrical engineering industry in Great Britain; in electrical wiring and contracting 781 (54 women); and in electrical apparatus, cables, lamps, etc., manufacture, 2,899 (1,292 women).

Works Visit

The branch managers of Philips Electrical, Ltd., accompanied by Mr. A. L. Sutherland, manager, Tungsten Lamp Department, and Mr. R. P. Sayers, manager, Lighting Department, recently visited Philips Blackburn Works, Ltd. Mr. C. de Wit, in welcoming his guests, briefly explained the organization of the factory, which employs 3,400 people, and then conducted the party on a tour of the laboratory and various manufacturing sections, including wire drawing and the production of filaments, electrodes, radio valves, fluorescent lamps and their apparatus. In the evening the branch managers entertained Messrs. de Wit, D. Ebben, A. R. Bruch, H. Kirkman and Dr. A. F. Best to dinner.

Wild-Barfield in India

To cover sales and service of standard Wild-Barfield furnaces and equipment in India, Pakistan and adjoining countries, and to carry out assembly and other constructional work, the Indian Wild-Barfield Co., Ltd., has been formed with offices at Fort Chambers, 6-10, Dean Lane, Hammam Street, Fort, Bombay. The company has also been appointed sole distributor and agent for the productions of G.W.B. Electric Furnaces, Ltd., including the larger mechanically operated heat-treatment equipment and " Eternite " case-hardening compounds, etc. The local management is under the control of Mr. R. A. P. Misra, who has recently returned to India from a prolonged stay in England during which he gained a thorough knowledge of the design and uses of Wild-Barfield furnaces. The formation of the Indian company supplements rather than supplants the arrangement with Alfred Herbert (India), Ltd., who have for many years looked after the company's interests in India.

New Flexible-Bearing Factory

By the transfer of their factory from Stratford-on-Avon to Wellesbourne House, Wellesbourne, Howard Clayton-Wright, Ltd., have greatly increased the capacity for making their flexible anti-vibration bearings, flexible couplings, washers and gaskets, mechanical mouldings, oil retainers, hydraulic packings and battery oil terminal oilers. The anti-vibration flexible mountings, bearings and couplings are being largely adopted in the manufacture of pumps, refrigerators, radio sets, instrument panels, etc., and the company is supplying mouldings and rubber parts for electrical condensers.

Reports on German Industry

The latest reports on German industry, obtainable from H.M. Stationery Office, include F.I.A.T. 1147, " A German Universal Condenser Microphone " (1s.) and F.I.A.T. 1183, " Compensation of Ground Current through Petersen Reactors and their Application in the Bewag 30-kV Network " (2s.).

Tin Plate Workers' Scholarships

The number of travelling scholarships which the Worshipful Company of Tin Plate Workers (*alias* Wire Workers) will allot during the forthcoming year has been increased to twelve. The conditions remain the same.

U.S. Trade with South Africa

Statistics issued in Washington regarding United States electrical trade with South Africa give a detailed picture of the recovery of American competition in this branch in the Union. The total value of electrical exports from the United States to that market in 1946 was $9,835,000. compared with $3,696,000 in 1945 and $7,518,000 in 1938. Included in the 1946 total were batteries $503,000 against $445,000 in 1945; transforming and converting apparatus

$291,000 ($113,000); transmission and distribution apparatus $471,000 ($156,000); motors, starters and controllers $550,000 ($297,000); electric refrigerators and parts $1,485,000 ($128,000); domestic electrical appliances $664,000 ($94,000); electric household washing machines $58,000 (unspecified); radio receiving sets $1,171,000 ($36,000) and other radio material $507,000 ($371,000).

Flashlamp Bulbs

The Board of Trade, in consultation with the Central Price Regulation Committee, has made the Flashlamp Bulbs (Maximum Prices) (Revocation) Order, 1947 (S.R. & O. 1947 No. 2820), H.M. Stationery Office, price 1d. The prices of flashlamp bulbs revert to control under the Prices of Goods Act, 1939, as amended. The Order came into force on 6th January.

Lamp Publicity

The theme of the current press advertising for " Atlas " lamps made by Thorn Electrical Industries, Ltd., pictures the moment of baffled exasperation when a lamp fails. The modern treatment of the new showcard now being issued by the company, carries this sales message a stage further. By means of a " balloon " on a solid grey background, a voice out of the darkness is made to exclaim " Atlas *this* time please." A section of an actual " Atlas " lamp carton fitted into the card stands out in relief. The only other wording is the slogan " For Staying Power," printed in black at the foot.

Accrington Salary Increases Not Favoured

Refusal of salary increases asked for by the Accrington borough electrical engineer and his deputy is recommended by the Corporation Electricity Committee, which feels that " due to national upset and financial chaos, no helpful purpose would be served at this juncture by granting them."

Aid to Kitchen Planning

Among the exhibits at the Restaurant and Catering Exhibition which will be held at Olympia from 16th to 24th January, is an unusual kind of model which not only simplifies kitchen planning generally, but should also be a great help during conferences of architects and manufacturers of components. The model consists of a complete set of kitchen components, made to scale, which are all strongly magnetized, similar to the small animals and other toys now made for children. In this way, as the components can readily be attached to each other or the base of the model, any type of kitchen can be arranged in a few moments. Various schemes can be tried out suitable for hotel, restaurant and canteen kitchens until the ideal arrangement is arrived at. On the stand of the British Electrical Development Association, where the model is to be seen, a staff of experts will be present to advise and help inquirers to solve their own particular problems in kitchen planning.

E.I.B.A. Northern Counties Area

The annual general meeting of the Northern Counties Area of the Electrical Industries Benevolent Association will be held on 22nd January, at 4 p.m., at the Royal Turk's Head Hotel, Grey Street, Newcastle upon Tyne, 1, under the chairmanship of Mr. T. C. Gray.

Coal Production

Provisional figures issued by the Ministry of Fuel and Power this week showed that the output of coal during the last week of the year was 3,092,700 tons, raising the year's production to 199,700,000 tons. Thus the total fell 300,000 tons short of the " target " but it was still nearly 8,000,000 tons greater than in 1946. The " target " for this year is 211,000,000 tons.

Kingston Fuel Economy Exhibition

The importance of the industrial activities of Kingston-on-Thames is emphasized in an exhibition which was opened on Monday last at the Public Library by Mr. A. Robens, Parliamentary Secretary to the Ministry of Fuel and Power. The exhibition has the somewhat novel title of " Kingston Can Make It—If . . ." and it has been organized to demonstrate to electricity consumers, and particularly domestic and non-industrial consumers, the important contribution made by local industries to export trade and the necessity of exercising economy in the use of electricity, particularly during peak hours. The Mayor (Mrs. E. H. R. Oldfield) introduced Mr. Robens, who said there were 181 industrial concerns in the area, employing nearly 7,000 people. These had last year reduced their maximum demand by 40 per cent. Their efforts, however, would be wasted unless non-industrial consumers exercised economy.

Many industrial concerns have co-operated in displays and each has a card showing the saving made in electricity consumption last year and the number of people employed. The Corporation Electricity Department's display consists of domestic appliances, showing how they can be used most economically. The centre of the display is a map divided into areas. By pressing a button visitors can light their own area and the number of workpeople employed in industrial premises is shown and an indication is given of the number of man-hours lost when load shedding becomes necessary.

Trade Publications

Philips Electrical, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.—Brochure (A.163) on single and twin tube industrial fittings for 40-W 4-ft fluorescent lamps, including installation features and mounting data.

Magnetic Controls, Ltd., 48, Old Church Street, Chelsea, London, S.W.3.—Four leaflets on "Instanta" relays, a.c., d.c., impulse on-off and mercury switch types.

Visco Engineering Co., Ltd., Stafford Road, Croydon, Surrey.—Catalogue (No. 471) illustrating various types of evaporative water coolers for power stations and industrial uses, including tabulated meteorological and other relevant data.

Sturtevant Engineering Co., Ltd., Southern House, Cannon Street, London, E.C.4.—Technical brochure (No. 7,102) describing the "Precipitron" electrostatic air filter.

Sun Electrical Co., Ltd., 118-120, Charing Cross Road, London, W.C.2.—Priced catalogue of commercial, industrial and fluorescent fittings; flood and spotlights; signs, time switches and accessories.

Trade Announcements

Northern Industries have moved to Snow Hill, Bradshaw Street, Manchester, 4.

Owing to its premises at Beatty Street, Camden Town, having been destroyed by fire, **British Diamix, Ltd.**, has moved to Metrum Works, Edgware Road, Cricklewood, London, N.W.2 (telephone: Gladstone 9861).

A. J. Evans & Son are taking over the business of Canterbury Factors, 41, High Street, Canterbury. Comprehensive stocks of electrical accessories, switchgear, cables, flexibles, etc., will be held, and the branch will be managed by Mr. L. A. Batchelor.

Progress Cables & Accessories Co., Ltd., has established a depot at 20a, Nelson Street, Edinburgh.

The Arora Co. has made arrangements with W. T. Rawcliffe & Son, Ltd., Murray House, 85, Piccadilly, Manchester, 1, to act as its agents in the North Wales, North-West England and Yorkshire area, as from 1st January.

Kerry's (Great Britain), Ltd., has opened a new branch at 24-25, Alphington Street, Exeter (telephone: Exeter 54848). The manager of the branch is Mr. L. H. Baker, who has been with the company for some years, and he will be assisted by Mr. C. E. Hannant.

Change of Address

The Association of Supervisory Staffs, Executives and Technicians has removed its head office to 110, Park Street, London, W.1 (telephone: Mayfair 8541-2).

Dissolution of Partnership

Messrs. C. G. Clews and H. E. Hyde, carrying on business as electrical engineers and contractors at 226, Stafford Street, Walsall, under the style or firm of Clews Electrical Co., have dissolved partnership by mutual consent. Mr. Clews will attend to debts and carry on the business under the same title.

E.R.A. Reports

INVESTIGATIONS carried out by Mr. A. M. Thomas on behalf of the British Electrical and Allied Industries Research Association (D/T34, 3s. 6d. net) appear to show that visual inspection before power-factor and electric-strength tests offers no advantages in eliminating defective capacitor mica plates. Tests by Mr. L. Gosland (G/T185, 7s. 6d.) on a 132-kV transmission line open at one end and comprising two relatively long overhead sections with a short length of interposed cable indicate that while voltages on switching in could be at least 15 per cent greater than for continuous overhead lines, they are unlikely to exceed those calculated from network parameters; on de-energizing such a composite line, transient voltages would not be either much greater or much less than four times the normal as experienced with an open continuous line.

In G/T198 (6s.), Mr. H. W. Baxter shows that arc energy liberated by a cartridge fuse on a.c. is substantially independent of the size of filler grain but is considerably influenced by the point on the wave at which arcing starts; the maximum arc energy is likely to occur when a given prospective current increases as the power factor is reduced; increasing fuse length may increase or decrease arc energy, depending on test conditions; a d.c. test for fuses intended solely for a.c. service appears impracticable.

Results of subjecting to surges a transformer winding that has been accidentally contaminated by moisture are discussed in conjunction with a mathematical analysis by Mr. K. L. Selig (S/T55, 3s. 6d.); the 250-kVA, 12,500/400-V transformer tested (by means of a recurrent-range oscillograph) has continuous disc windings on each of its two limbs. A résumé of published data, theoretical and experimental, on the transfer of material, temperature and stability of an electric welding arc has been prepared by Mr. J. C. Needham (Z/T61, 7s. 6d.) for the E.R.A. in co-operation with the British Welding Research Association; a bibliography of over 100 references is included.

The conversion of an Army receiver for interception work with a view to measuring radio interference is described by Messrs. S. F. Pearce, A. Turney and D. C. G. Smith (M/T90, 13s. 6d.); converted sets are available for industrial use and working drawings can be obtained from the Association. Measurements of radio interference carried out by S. F. Pearce (M/T92, 1s. 6d.) on the L.M.S. Railway show that the production of interference is associated with the operation of controls on the trains and not to supply circuits, that the level is attenuated approximately in inverse proportion to the square of the distance from the track and varies in inverse proportion to frequency, and that it is unlikely to cause important interference with broadcast reception.

Standard Very-High Voltages

International Aspects that Affect Choice of Levels

*By P. Ailleret**

STANDARDIZATION of voltages above 220 kV is engaging the attention of the International Electrotechnical Commission, whose Advisory Committee No. 30 (Extra-High Voltages) met in Lucerne on 20th and 21st October last. There are two main aspects that justify standardizing, that of the construction of equipment and that of the direct connection between systems. Their relative importance with reference to very-high and ordinary voltages is not identical. For very-high voltages bulk manufacture cannot be considered, so that the advantages of standardization chiefly relate to design and secondary equipment. On the other hand the radial distances covered are becoming such that interconnection between remote systems in different countries has to be envisaged.

Maximum Voltage Governs Performance

In regard to equipment, it is the maximum voltage in normal operation which determines the performance of the system. Whatever the voltage drop, the maximum voltage controls the operation of the circuit breakers and the level of the excess voltages they can generate and apply to the transformers on the system; thus two systems, one operating at from 210 to 240 kV and the other at a more constant voltage between 235 and 240 kV, call for the same type of equipment. On the other hand the practicability of interconnecting two systems without upsetting the operation of either, causing heavy exchanges of reactive power or reaching the limits of the regulation load depends much more on the average than the maximum voltage.

At Lucerne the definition in the I.E.C. Rules of " average " voltage, which was there referred to as the " receiving end of the system," was abandoned because the structure of so many high-voltage systems had robbed it of meaning. It was decided to refer it instead to the average value, integrated in time and space, all along the system. While measurement could not be based on such a definition, the corresponding voltage could be estimated in accordance with a definite concept; thus every system is identified by two voltage figures, maximum and average.

This leaves insulation out of account. It must be possible, however, to specify the impulse voltage which the equipment can withstand independently of system voltage, since other parameters come into play, such as the use of lightning arrestors, spark-gap settings, severity of strokes and compromise between cost and security. It was decided for the time being to quote the average and maximum values to characterize the voltage of a system and to avoid using the terms " nominal " and " basic " voltage, the meanings of which vary from country to country.

Standard voltages of the I.E.C. (200 kV average at the receiving end and 220 kV maximum) have not been adopted anywhere. All systems termed 230 kV in the United States, 220 kV in France and Italy and 200 kV in Sweden operate under conditions so similar that they could be interconnected directly or use the same apparatus; their average voltage is about 220 kV and their maximum 240.

Distances and Loads

Voltages may have to be raised in order to carry power over longer distances or to increase the amount of power to be transmitted. The capital cost of a number of lower-voltage circuits will be much more than that of fewer lines at higher voltage. Statistically voltage is closely related to power transmitted per circuit, e.g., 110 kV to 30,000 kW, 150 kV to 50,000-70,000 kW and 220 kV to 120,000-140,000 kW, increasing as the square root of the load or perhaps a little faster. Output is being doubled every ten to twelve years, pointing to a doubling of voltages within twenty years or so, and technical developments would only delay the necessity.

The need to raise voltage with growth of output will be intensified where the number of lines along a route cannot be increased. Greater outputs may also cause higher short-circuit currents than can be dealt with by improvements in circuit breakers. Existing systems cannot then be fed direct from new power plants, and are sometimes divided into

* Director and Chief Engineer, Design and Research, Electricité de France. Based on article which appeared in the Proceedings of the French Institution of Electrical Engineers.

sections with a higher-voltage interconnection. An example is the construction in England of a 275-kV line of 46 miles (75 km) with three groups of two conductors arranged horizontally; for experimental purposes both ends will be connected to the 132-kV grid through auto-transformers.

Other recent very-high voltage developments include a 250-mile (400-km) line in France, which has been in operation since January, 1947, comprising two 220-kV circuits capable of being converted to a single 400-kV circuit. Also an experimental station carrying a 1,600-ft (488-m) span and a bank of three single-phase transformers giving adjustable voltages between 300 and 500 kV has been used for experiments in connection with corona effects (notably with two groups of conductors) since December, 1946.

In Sweden a 600-mile (970-km) 380-kV line with three two-conductor groups horizontally arranged is under construction for bringing power from the new Harspranget hydro-electric station to the south. In Switzerland, on a 31-mile (50-km) stretch where the number of towers could not easily be increased, a line is being erected to carry two circuits far enough apart for 400-kV operation. This is an extension of the Gothard line, which already carries a single circuit and is to be doubled by a single circuit, but at present only the towers are designed for 400 kV. Finally there is the experimental station just put into action near the Tidd plant in the United States, consisting of two three-phase lines each with several spans fed at voltages up to 500 kV.

Possible Capital Cost

Judging from the higher-voltage lines already erected, the raising of 202 kV to 400 kV with conductors of twice the size doubles the capital cost. The corresponding increase in prices for transformers and circuit breakers is not readily evaluated, but figures for pioneer 380-400-kV equipment should not be compared with those for 220-kV equipment now made in quantity. Early 220-kV gear seemed to indicate a very steep growth in the price of equipment for voltages above 150 kV, but when it became more generally used the rate of increase was found to be not nearly so high.

There is no preferred ratio for voltage steps; neither 2 nor $\sqrt{3}$ is of interest at the high voltages under discussion, as equipment could not be built for changing over from one voltage to another. Further, no useful purpose is served in restricting the choice to normal multiples of basic voltages. Those too close to one another are to be avoided. The choice of 220 kV is regarded by some as an error in view of the wide adoption of 150 kV at the time. It would have been better to have waited a few years and jumped to about 280 kV.

International agreement on the higher voltage would be easy if we could start from the same lower voltage in all regions, but the new value is to be superimposed not only on 220 kV but also on 150 and 132 kV. This difficulty would, however, disappear if due attention were paid to the distances to be covered by future interconnections at 380-400 kV. With the growth of consumption, these new voltages will appear in regions now too remote for interconnection but which can then be easily welded all along their edges, provided the existing voltage difference is not too great.

Wider Economic Views

Considerations of economic aspects should not be confined to local problems, but should take into account the overall economy of the total area to be covered by future interconnections. In that way the same voltage level can be adopted everywhere, since calculation of the optimum voltage for a new transmission line leaves a large margin of uncertainty.

Several countries had projected higher voltages with a view to approaching the values under consideration in the United States, but are prepared to agree to a level of 380 kV as the average operating voltage (space-time) and 400 as the maximum (space-time). The countries willing to adopt the above standard are: Austria, Czechoslovakia, France, Italy, Portugal, Sweden and Switzerland.

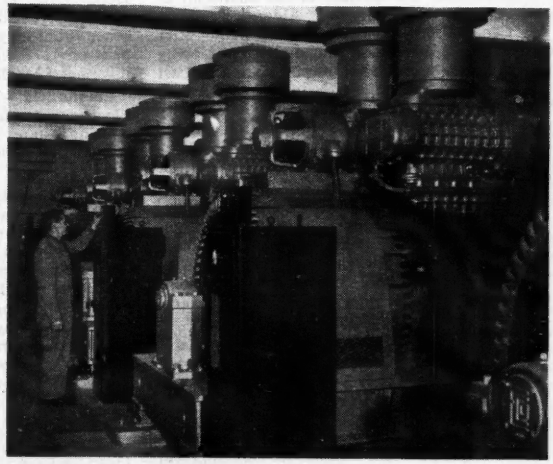
The United States has referred to the possibility of adopting a level in which the maximum voltage would be 386 kV, but is awaiting the results of tests on its experimental line. Should the United Kingdom choose the 275-303 kV of the Boulder Dam—Los Angeles line instead of twice the value of the voltage of the 132-kV grid, increase in the use of this voltage would lead to its consideration as a standard. It would, however, be applicable only to regions where it is already in use, as in California, or where 220 kV is not yet used, as in Great Britain, Africa and Asia.

Diesel Generating Station

Motor-car Manufacturers Solve Power Problem

TO safeguard production during power cuts and to eliminate night work introduced under the load-spreading scheme Vauxhall Motors, Ltd., have established a diesel generator station at their factory at Luton. With a capacity of 5,000 kW the station is claimed to be the largest diesel generating plant in the country and, operating twenty-four hours a day, five days a week, it will supply 40 per cent of the power requirements of the factory, which employs 12,000 people and produces 300 vehicles a day.

There are five diesel generator units, each with an output of 1,000 kW (1,750 kVA at 0·8 p.f.). Generation is at 6·6 kV, voltage regulation being provided from 5·8 to 6·6 kV. The diesel units, which are of the type used during the war as the main propulsion units for tank landing craft, are 2-stroke units, each with sixteen 55,000-c.c. cylinders arranged in two banks of eight. Each engine develops 1,440 b.h.p. at 750 r.p.m and consumes 65 gallons (295 litres) of fuel oil an hour.



Five 1,000-kW diesel generating sets have been installed at the Vauxhall motor works to safeguard production during power cuts and eliminate night work

Arrangements are made for the sets to be run in parallel with the 6·6-kV supply from the Luton Corporation Electricity Department, a wattmeter relay device giving unidirectional protection against fault on the outgoing feeders from the generating station. Prevention against feed-back into the Corporation's system is taken care of manually in conjunction with an Elliott remote wattmeter system. Duplicate busbars are provided and the 6·6-kV 400-A Reyrolle oil-circuit breakers employed have a rupturing capacity of 250 MVA.

The diesel sets are electrically started either from a Standard Telephones rectifier set operating from the 440-V works supply and giving 64 V, 700 A (2,100 A peak) d.c. or from batteries, which are also utilized for emergency lighting. The exciters, which are driven at 2,750 r.p.m. from the blower shaft, give a 125-V, 80-A excitation current. A 5-panel Reyrolle switchboard, which controls the diesel sets, incorporates both individual and summation metering instruments (Metrovick), recorders (Elliott Bros.), remote governor control and exciter field regulation.

A 100,000 cu ft (2,830 cu m) a minute fan, driven by a 75-h.p. Bruce Peebles motor, supplies conditioned air to the diesel house. The air washer is driven by a 25-h.p. Brook motor. Waste heat from the diesel exhausts is utilized to heat water for factory processing. Three thermostatically controlled water coolers operated by 25-h.p. motors cover all five diesel sets. All the auxiliary plant and 6½ kW of fluorescent tubes are controlled by a separate panel. An English Electric 1,000-A air-break circuit breaker controls the 440-V feeder for all auxiliaries.

A striking feature of the installation is its compactness, the whole equipment being housed in an area 70 ft (21·3 m) by 40 ft (12·2 m); space is available for two additional sets if required. Another point of interest is the speed with which the installation has been carried out. It was only last March that the generators were ordered from the Vauxhall company's American associates, the General Motors Corporation. The first generator unit was shipped on 26th October and all five sets were in operation by 30th December.

At the official inauguration of the plant on that day Mr. J. R. Pearson, director and factory manager, said that the plant would enable the company to maintain full production even during power cuts and would also help to remove some of the necessity for night work and its consequent higher production costs.

Mr. C. T. Melling, Luton borough electrical engineer, who has recently been appointed chairman of the Eastern Area Electricity Board, pointed out, however, that while alleviating the power position to some extent the provision of similar plants did not provide a solution to the general shortage of generating capacity. The plant just started up had an output of 5,000 kW, yet the country's peak load generating deficiency amounted to no less than 2½ million kW. The scaling down of generating plant programmes should, therefore, be strongly resisted.

ELECTRICITY SUPPLY

Naming Belfast Turbo-alternator. Electric Kettles at Tottenham.

Belfast.—HARBOUR STATION EXTENSIONS.—In recognition of the services of the chairman of the Electricity Committee, Alderman Major W. Cecil M'Kee, it is proposed to name after him the new 30,000-kW turbo-alternator being installed at the Harbour power station. Last week the city electrical engineer (Mr. W. J. McC. Girvan) presented a report on the necessity for further extensions to the station, to be ready for operation in 1953.

Birkenhead.—WIRRAL AND BEBINGTON SUPPLIES.—The Electricity Committee has approved a scheme for increasing the electricity supplies to the Wirral and Bebington areas by the provision of underground and overhead feeders from the new power station site at Bromborough to Plymyard, and the construction of a new switchhouse and transforming station at Plymyard, at a total cost of £92,561.

Bradford.—REVISED CHARGES.—The Estimates Sub-Committee last week approved the proposed revision of electricity charges to domestic consumers, estimated to yield an added revenue of £98,000 a year.

IMPROVED SUPPLIES.—At an estimated cost of £15,314, the Electricity Committee is to augment the supply of electricity in the Great Horton, Horton Bank Top and Wibsey districts.

Burton-on-Trent. — EXTENSIONS. — Subject to obtaining the necessary sanction the Corporation is to supply electricity to eighty-nine permanent houses to be erected at John Street and Alma Street, Newhall and at Drayton Street, Swadlincote. The l.v. distributor cable will cost £3,550 and services £880. A scheme is being considered for extending mains to supply fifty-two premises on the Duchy of Lancaster Estate in the Hanbury, Marchington, Woodlands, Newborough, and Newchurch areas; it will be necessary to provide additional h.v. and l.v. underground and overhead lines, and fourteen 10-kVA or 25-kVA pole type transformers. The necessary h.v. and l.v. lines will cost the Council £4,670, transformers £1,620 and services £451. A supply to Robinson & Dowler, Ltd., at Overseal, will require additional switchgear and a transformer costing £1,330.

Clayton.—NO REBATE.—Electricity consumers in the Clayton district of Bradford are not to receive the rebate payable by the Yorkshire Electric Power Co., resulting from the Ilkley test case. The Clayton supply is administered by Bradford Corporation Electricity Department, and it is reported that, as they have enjoyed the same rates and charges as other Bradford consumers, it is not proposed to pass on to them the amount of the rebate of just over £2,000.

Chesterfield.—SUPPLIES TO NEW ESTATES.—Electricity services are to be provided to new housing estates in the town and rural district at a cost of £2,804.

Ilford.—NEW FEEDERS.—Consent has been given to the borrowing by the Town Council of £25,100 for two 33-kV cables between the Clark's Road and Uphall substations.

TRANSFORMER CHAMBERS.—Additional transformer chambers are to be established in Sunnyside Road; Mill Road, near Ilford Hill; Chadwell Heath Lane, near Grove Road and High Road, Goodmayes, near Kingswood Road, for the purpose of meeting demands for alternating current supplies and to provide for future change-over works in these localities. Quotations are to be invited for the supply of ten nine-way three-phase four-wire distribution panels.

Seaham.—INCREASED CHARGES.—The Urban District Council Electricity Department has raised electricity charges owing to increased costs. The domestic tariff has been raised by one-fifth of a penny per kWh; ordinary lighting, slot meter lighting, assisted wiring and wireless plugs by 12½ per cent; industrial supplies by ½d. per kWh; and theatre and club supplies by ¼d.

Tottenham.—PURCHASE OF KETTLES. — The Council is to buy 100 electric kettles at a cost of £2 6s. 11d. each for resale to tenants on housing estates. This action is being taken because tenants have experienced difficulty in obtaining kettles themselves, and ordinary kettles used on electric stoves are less economical in electricity.

The Preston Jubilee

LAST year the Preston Corporation electricity undertaking celebrated its silver jubilee. To commemorate the event, a brochure has now been published containing a history of the undertaking with much tabular matter showing its rapid development. The brochure is profusely illustrated with pictures of plant installed at Ribble generating station, the distribution network, the electricity showrooms and other activities of the Electricity Department.

Manufacturing Progress

Activities of the English Electric and Brush Companies

A NOTABLE event in last year's activities of the ENGLISH ELECTRIC CO., LTD., was the opening of the Nelson Research Laboratories (*Electrical Review*, 14th November). Prominent among the home orders received for 3,000-r.p.m. three-cylinder turbines were a 60,000-kW unit for Fulham, a further 50,000-kW unit for Birkenhead (both with hydrogen-cooled alternators) and two of 45,000 kW for the Yorkshire Electric Power Co. Others in hand included 30,000-kW units for West Ham, South Wales Power Co., Clyde Valley Power Co. (two), Bolton, a second 40,000-kW set for Blackburn (33 kV) and one of 20,000 kW for Warrington.

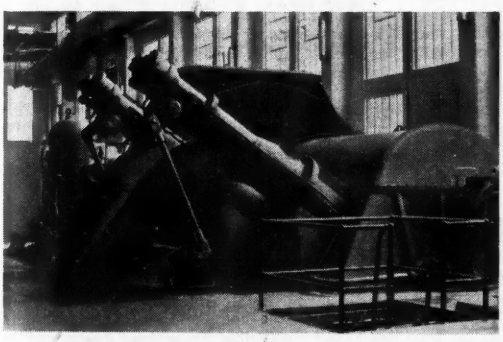
Foreign orders were exemplified by two 30,000-kW turbo-alternators for Finland and a repeat order for a 7,500-kW unit for a South American oil company. Those shipped or commissioned overseas were represented by a 25,000-kW double-passout set and a single-cylinder 18,750-kW set for South Africa. In the majority of cases mentioned, condensing and feed-heating plant were included.

Many contracts were entered into for hydro-electric plant. One of the most comprehensive was for Cofrentes power station, Spain, covering three 36,000-kW, 300-r.p.m. vertical turbines and a 600-kW auxiliary unit, together with gates, pipe lines, switchgear and transformers. The North of Scotland Hydro-Electric Board ordered sets of 22,000 kW (three) for Glen Affric, 40,000 kW for the Glen Shira project, 8,400 h.p. for Gaur (Pitlochry) and 16,750 h.p. (two) for Luichart, all of the vertical reaction type. A third 18,750-kVA unit was ordered for the Tarraleah power station in Tasmania and two 12,000-kW units for Travancore.

Examples of Fullagar oil engine sets in hand are: Four of 1,960 b.h.p. for Singapore, two of 1,470 b.h.p. for Guernsey, one of 1,880 b.h.p. for Aberystwyth, one for Broken Hill City, Australia, and three for Khartoum. Diesel engines for traction (38) have been ordered by British railways, rail cars (9) by the Iraq Railways and 600-h.p. turbo-pressure-charged diesel-electric units (10) by the Tasmanian Government and also by many shipbuilders. The first main-line diesel-electric locomotive for a British railway (1,600-h.p., six-motor, 10–6–6–0) was completed.

Totally enclosed, air-pressure-immersed, air-blast switchgear rated at 1,500 MVA at 33 kV is being supplied (six units) to Leicester; vertical isolation is effected by pneumatically operated thrustors, and air within the metal-clad chamber is at a pressure slightly above atmospheric. Air-break 3·3-kV circuit breakers have been ordered for the auxiliaries of ten British power stations. In addition, more than 300 air-break circuit breakers are included in lower-voltage switchboards for home and foreign service.

Contracts for large 132-kV air-blast installations include fifteen 2,500-MVA units for the Central Electricity Board and thirteen of 1,500 MVA for the North of Scotland Hydro-Electric Board. For duties up to 2,500 MVA and voltages up to 165 kV, the same type is to be sent to Spain (12), Portugal (7), Tasmania (11), Sweden (2), and oil breakers to Madras and Johannesburg (7 in each case), in addition to main and auxiliary switchgear for Basin Bridge "B" power station and associated substations in Madras.



One of the two present English Electric 21,000-kW turbo-alternators in the Tarraleah hydro-electric power station, Tasmania

For the first 220-kV system in Australia (Victoria), seven 18,000-kVA and four 16,666-kVA single-phase transformers are being built. Other large transformers for comparable voltages are in course of manufacture for Finland (64,000 kVA) and Russia (40,000 kVA). Three 24,000-kVA, 220-kV arc-suppression coils for Finland are believed to be the largest and highest-voltage units yet ordered for that country. Further examples are furnished by five 45,000-kVA, 88-kV units for the Victoria Falls & Transvaal Power Co. and 132-kV units of 35,000 and 23,000 kVA for Scottish hydro-electric schemes (7), of 58,000 kVA for Birkenhead (4) and of 60,000 kVA for Brighton (3). Further 132-kV, 90,000-kVA throughput single-phase magnetically shielded reactors with 18 per cent reactance were ordered by the Central Electricity Board.

Air-cooled pumpless rectifiers for export included seven 1,000- and 1,500-kW equipments for rolling mills in South Africa and in Sweden and for the N.S.W. Government Railways, and two of 3,000 kW for Stockholm underground railway. A further grid-controlled rectifier ordered by the Bristol Aeroplane Co. (for gas-turbine development) will increase the rating of this type of plant there to 8,400 kW. Rectifiers for 15,000 V are also in hand for radio transmitters in Sweden, Spain, Poland and Holland.

Approximately half of the numerous orders for rolling-mill drive were from abroad, embodying motors with r.m.s. ratings of up to 7,300 h.p. Outstanding among the home orders was a twin-drive reversing mill in South Wales, the first of its kind in this country. Electric winders required for abroad were chiefly for a.c. with d.c. dynamic breaking, but the Ward-Leonard system was also in demand; some of the former employed 4.000-b.h.p. (r.m.s.) twin driving motors. Industrial motors, including fractional-horse-power sizes, were in especial demand for the textile, jute, cement and coal industries and for driving power station auxiliaries.

In addition to meeting the needs of Government housing schemes, the company is exporting large quantities of domestic appliances. A new range of portable indicating instruments formed part of the output of meters.

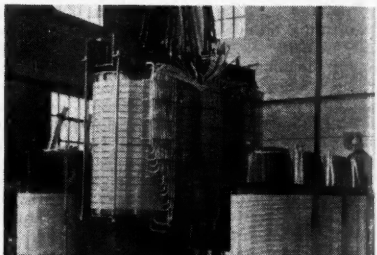
Developments at Loughborough

One of the chief developments of the BRUSH ELECTRICAL ENGINEERING CO., LTD., was the design and production of a range of Buxton-tested flameproof motors for collieries and other situations where explosion risk is high; the machines are steel barrels and are fan- or self-cooled. For the textile industry, ranges of ring-frame motors and loom motors were developed. Larger motors are exemplified in the motor-generator set for supplying 4,000 A for the production of hydrogen at an Indian electrolytic plant.

There was an unprecedented demand for alternators by oil-engine makers. A shunting and transfer locomotive, incorporating a Petter superscavenge four-cylinder diesel engine, is now undergoing running tests. Three power units out of five ordered for shunters on the Irish railways have been delivered.

Transformers built extended from small lightning-proof pole-mounting units up to those with a capacity of 30,000 kVA; all new designs were subjected to impulse tests, the recurrent surge oscillograph installed at the works being in constant use. Several units of 15,000 and 20,000 kVA were completed for the Central Electricity Board, and others for 132 kV are in course of manufacture. Export orders, in hand or carried out during 1947, included transformers of up to 12,000 kVA at 88 and 110 kV as well as lower voltages for Sweden, Latin America, South Africa, New Zealand and India.

New vertical draw-out switchgear includes 600-V, 3,000-A, 40-kA units. Industrial fuse-switchgear has been designed for 2-, 3- and 4-pole h.r.c. cartridge fuses up to 300 A for distribution boards in combination with oil circuit breakers. Typical of exports were a round-tank cell-



Corner of the Brush Company's Transformer Shop; showing a 15,000-kVA unit for the Central Board at Cowes, two 12,000-kVA transformers for Sweden, and the core of a 20,000-kVA unit for the Central Board at Neath

mounting 22-kV, 250,000-kVA oil circuit breaker for India and weatherproof kiosks for Iceland. Contracts are in hand for turbines for producing steam as well as electricity for the textile and other industries here and overseas.

Huddersfield Report

THE year covered by the latest report of the Huddersfield borough electrical engineer (Mr. F. A. Ellis) saw the commissioning of extensions at the St. Andrew's Road generating station and the completion of the first stage of a 33-kV distribution scheme sanctioned in 1945-46; the second stage of this work is now in hand. The quantity of electricity sold during the year, 177·8 million kWh, was 86·17 per cent more than in 1945-46, industrial and commercial supplies increasing from 107 million to 121·4 million kWh and domestic from 44·5 million to 56·4 million kWh. The average price received per kWh sold fell from 0·80 to 0·76d.

Total income advanced by £88,042 to £638,731, with working expenses up by £112,921 to £623,750. After meeting loan charges there was a net surplus of £19,800 (against £10,910). A sum of £18,396 has been contributed to the rates.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The Radio & Television Trust, Ltd.—The annual meeting was held on 31st December. In a statement issued with the report and accounts, Mr. L. D. Bennett (chairman and managing director) says the company was unable to take advantage of the big demand in the British Isles for Philco radio and television receivers owing to the effects of the fuel crisis, the continuing shortage of materials, and the small Ministry of Supply quota. On the export side, sales of Airmec receivers had been encouraging until additional currency and licensing restrictions closed many of the markets in which the company had become firmly established. These difficulties prevented the Perivale factory being operated on the full production scale necessary for profitable working.

The Perak River Hydro-Electric Power Co., Ltd.—In the course of his speech at the annual meeting held on 30th December, Mr. W. Shearer (chairman) said that the report and accounts under review represented the first full year's trading since the Japanese occupation. Despite slow delivery of materials a good start had been made in the programme of restoring the system to pre-war conditions. Large sections of the second circuit of the main 66-kV transmission line were removed by the Japanese. These had been replaced and this important line was now ready for service again. Arrangements had been made for the return of the 12,000-kW steam turbine which the Japanese removed from the Batu Gajah station and installed in Singapore. Considerable expenditure must still be incurred to restore the plant to its pre-war efficiency.

Decca Record Co., Ltd.—Details of progress with the Decca Navigator were given by Sir Cyril Entwistle (chairman) at the annual meeting last week. After referring to the assistance given in bringing coal to London in foggy weather at the time of the fuel crisis, he said that since the company's last meeting contracts had been completed for the fitting of over four hundred ships. At the second International Marine Conference in New York the system was unanimously approved by the 32 nations present. Following the decision of the Danish Government to adopt the system a subsidiary company had been formed in Denmark. As regards air navigation, trials had been taking place throughout the year.

General Cable Manufacturing Co., Ltd.—Commenting on the accounts at the company's annual meeting last week, the chairman (Mr. C. W. R. Pantlin) said that the profit constituted a record for the company. At the end of 1943 they had decided to embark upon a comprehensive reconditioning scheme and to undertake extensive developments in plant and buildings. That scheme had now been completed as far as plant and machinery were concerned, with the result that production had moved steadily upwards—the additional output being obtained in approximately the same number of man-hours as in the previous year—and sales had reached a new high level. During the year a bonus scheme had been introduced for the staff and workpeople.

Calcutta Electric Supply Corporation, Ltd.—Under an agreement between the Governor of Bengal and the company made in October, 1945, it was laid down that two years' notice must be given of intention to purchase the undertaking. No notification has been received for exercising the option on 1st January, 1950, and the next date for purchase under the agreement will be 1970.

English Electric Co. of Canada.—Meetings are to be held on 2nd February to consider a proposal whereby the company would become a wholly-owned subsidiary of the John Inglis Co., of Toronto. Holders of "A" shares would receive two shares of no par value stock in John Inglis and £3 cash for each "A" share held. Holders of "B" shares would receive one Inglis share for each two "B" shares held.

Thorn Electrical Industries, Ltd.—At a meeting on Monday last resolutions were unanimously passed approving the increase of capital to £606,250 by the creation of 400,000 5 per cent second cumulative preference shares of £1.

The Victoria & Transvaal Power Co., Ltd., is paying an interim dividend of 4½ per cent (same). The 6 per cent participating preference receive 7 per cent which includes 3 per cent for the half-year ended 31st December, plus 4 per cent participating rights.

The Electric Furnace Co., Ltd., has declared an interim dividend of 3½ per cent (unchanged).

Cornwall Power Co., Ltd.—By the Electricity (Cornwall Power Co., Ltd.) Order, 1947, the Electricity Act, 1947, is deemed to have effect as if the company were an electricity holding company.

New Companies

Goodall & Co. (Contractors), Ltd.—Registered 23rd December. Capital, £3,000. To acquire the business of Goodall & Co., carried on by T. E. Nankivell at 2a, Wakeling Street, Commercial Road, E.1, electrical engineers and contractors, etc. Directors: T. E. Nankivell and R. S. Nankivell. Regd. office: 607, Cable Street, Stepney, E.1.

Alder Hardware & Electrical Co., Ltd.—Registered 23rd December. Capital, £5,000. Directors: D. Brook, J. Brook (director of Dewhurst & Partner, Ltd.) and A. Dewhurst. Regd. office: 181, New King's Road, Fulham, S.W.6.

Lion Electrical Co., Ltd.—Registered 22nd December. Capital, £500. Mechanical, electrical and general engineers, etc. Directors: G. W. F. Richards, D. H. King, and G. J. Hunt. Regd. office: 25, Marshgate Lane, Stratford, E.15.

Bankruptcies

C. A. Jay, Dale House, Dipton, Durham, and carrying on business as electronic instrument maker under the name of A. G. Jay & Co., at 32, Clayton Street West, Newcastle-on-Tyne.—First meeting held 7th January. Public examination 3rd February at the Court House, 56, Westgate Road, Newcastle-on-Tyne.

B. G. Wright, 15, Hounsfield Road, Sheffield, trading as Wright's Electrical Co., electrical engineer.—Discharge suspended for three months until 27th February.

J. Woolcock, wireless and electrical engineer, lately carrying on business and residing at Iridge Cottage, Hurst Green, Sussex, and also at John Cross, Mountfield, Robertsbridge.—Receiving order made 30th December, 1947, on a creditor's petition.

A. S. Britton, residing and carrying on business at 9, Moorside Road, Heaton Moor, Stockport, and also carrying on business at 123, Higher Hillgate, Stockport, radio engineer and electrical contractor.—Trustee, Mr. A. T. Eaves, 47, Mosley Street, Manchester, 2, released 23rd December, 1947.

Liquidations

Cosmos Manufacturing Co., Ltd., and **Edison Swan Cables, Ltd.**—Winding up voluntarily. Liquidator, Mr. D. Q. Holland, Crown House, Aldwych, London, W.C.2. (Members' voluntary winding-up).

As we reported in our issue of 19th December, these two companies have been absorbed by the Edison Swan Electric Co., Ltd.

Robdor Radio & Electrical Appliances, Ltd.—Particulars of claims by 2nd February to the liquidator, Mr. P. Phillips, 76, New Cavendish Street, London, W.1.

This is a members' voluntary winding-up and all creditors have been or will be paid in full.

Hume Electric, Ltd.—The first meetings of the creditors and shareholders were held at the offices of the Board of Trade, Columbia House, Aldwych, London, W.C., on 31st December, when the Official Receiver reported that the winding-up order was made on 1st December. No statement of affairs had been filed but the liabilities were estimated at £5,435, against assets which had not yet been valued. The failure of the company was attributed to losses sustained in the manufacture of electric toasters and towel rails, to lack of capital and other causes. A resolution was passed for the appointment of Mr. David Morgan, I.A., 11, Argyll Street, London, as liquidator of the company, together with a committee of inspection.

Swiss Electrical Imports

IN our issue of 19th December we reproduced figures showing the expansion of Swiss electrical export trade in 1946. The following table shows that there was also a substantial increase in electrical imports. France made a noteworthy reappearance as a supplier and Holland and Hungary were prominent in their particular lines. (17 Swiss francs = £1.)

	1946 Fr.(000)	Inc. or dec. on 1945 Fr. (000)
Accumulators	950	+ 672
From United States	102	+ 102
„ *France*	162	+ 160
„ *Sweden*	602	+ 375
Insulators	972	+ 842
From France	237	+ 214
„ *Denmark*	640	+ 540
Meters and measuring instruments	1,248	+ 936
From United States	611	+ 610
„ *France*	214	+ 171
Radio apparatus	9,053	+ 5,092
„ *Great Britain*	1,197	+ 984
„ *Holland*	2,754	+ 1,646
„ *Hungary*	605	+ 406
„ *France*	692	− 184
„ *United States*	2,668	+ 2,554
Telegraph and telephone apparatus	4,959	+ 2,387
From Belgium	3,069	+ 885
„ *Great Britain*	1,547	+ 1,540
Glass rectifiers, with or without mercury	116	− 1
From Holland	90	+ 5
Unspecified electrical apparatus over 500 kg	126	+ 126
From France	120	+ 120
Ditto 50 to 500 kg	120	+ 56
From Holland	55	+ 40
„ *Great Britain*	19	+ 19
Ditto 3 to 50 kg	143	+ 113
From United States	42	+ 42
„ *Sweden*	25	+ 19
„ *Great Britain*	20	+ 20
Ditto under 3 kg	1,310	+ 774
From Italy	168	+ 168
„ *Holland*	564	+ 462
„ *Belgium*	209	− 15
„ *France*	103	+ 94
Dynamo-electric machines	3,273	+ 2,788
From Czechoslovakia	1,633	+ 1,533
„ *Italy*	536	+ 529
„ *France*	253	+ 166
„ *United States*	350	+ 345
Lighting and starting equipment for vehicles	1,007	+ 747
From France	225	+ 215
„ *United States*	391	+ 367
Insulated wire and cable	425	+ 362
From Holland	67	+ 67
„ *Belgium*	226	+ 167
„ *Great Britain*	75	+ 75
Electric incandescent lamps	3,831	+ 2,296
From Hungary	397	+ 395
„ *Holland*	2,971	+ 1,563
„ *United States*	118	+ 118

STOCKS AND SHARES

THE New Year in the Stock Exchange opened with the issue of the British Transport 3 per cent stock 1978–1988, the advent of which had given rise in advance to so much speculation and speculative dealing. Home Railway stocks have now disappeared. Stock Exchange jobbers who previously dealt in the stocks have started business in other securities. Holders of Home Railway stocks nourish a deep, and justifiable, sense of grievance at the reduction which, to the great majority of proprietors, the nationalization scheme means to personal incomes.

British Transport Threes

In advance of the official announcement of the issue, a widely-spread and pressing demand sprang up for ordinary stocks and shares from which a better income can be expected than the British Transport stock yields. The full extent of the rise resulting from this demand was not held, but, as compared with a month ago, substantial improvements have occurred on balance. The 3 per cent Transport Stock started at 97, a discount of 3 points. Judged by earlier precedents, improvement in the future to the neighbourhood of three figures is, to put it colloquially, on the cards. The vesting date for the take-over of electricity supply undertakings, the next on the list, is fairly certain to be 1st April next.

December's Advances

As can be seen from the accompanying investment list, electrical shares took a prominent part in December's market rally. General Electrics at 95s. and A.E.I. at 87s. 6d. each finished the month 8s. 9d. to the good. Most of the other leaders in the electrical equipment market show gains of around half-a-crown. Lancashire Dynamos put on as much as 17s. 6d. to £6. Tube Investments at 7¼ and Westinghouse Brakes at 72s. 6d. are 10s. up. Decca gained the same amount, and there are marked improvements in E.M.I., Cossors and Pye. Telephone and cable shares also had a good month, Automatic Telephones adding 8s. 9d., to 67s., and Johnson & Phillips 5s. to 76s. 3d. Crabtree, at 46s., and Ever Ready at 39s. are particularly firm. Brush finished with a net gain of 1s. 3d. at 7s. 6d. Electricity supply shares are practically all 1s. to 2s. higher than a month ago. An advance of 8s. 6d., in Tillings, now 76s., typifies the strength of transport issues. British Electric Traction deferred stock at 1,500 compared with 1,150 at the beginning of last year.

British Insulated Callenders

British Insulated Callenders Cable £1 units have recovered to 40s. 6d. after the recent disappointment aroused by the 2 per cent interim dividend for 1947. At first glance, the comparison with the previous interim of 4 per cent paid on account of the eighteen-month period to December, 1946, appeared unfavourable. Now, the tendency is to read less significance into the latest distribution. Before the merger, British Insulated paid a regular 5 per cent interim dividend, followed by a final of 15 per cent. Shares were exchanged into the new company on the basis of three new for one old. In proportion, therefore, similar distributions would work out at 1¾ interim and 5 per cent final on the present capital. This total of 6¾ per cent equals, in fact, the annual rate of the 10 per cent actual distribution made for 1945–46. On this line of reasoning, the 2 per cent interim now being paid represents an advance, and has led to speculation as to a total payment of 8 per cent for the year, which would put the shares on a 4 per cent yield basis.

Crompton Parkinson Accounts

Crompton Parkinson's annual meeting was adjourned until 16th January to allow time for the first presentation of the company's accounts in consolidated form. Interests in subsidiaries accounted, in last year's balance-sheet, for £1,826,000 of the parent's assets. The figure is only £106,000 less than the total issued capital. Interest is naturally keen to have a better view of the financial resources and earning capacity of the business as a group. Preliminary figures and dividends, issued before Christmas, showed a modest expansion in the parent company's earnings, which appear to cover amply the repetition of the year's distribution at 22½ per cent (including 7½ per cent as bonus). With the 5s. "A" shares at 30s. ex-dividend, the yield is 3¾ per cent, and roughly in line with other leaders in the electrical equipment market.

Dividends in Doubt

In the table of share prices and yields given here once a month, it will have been noticed that the yield column shows an occasional exception to the money rate given in other cases, a dash being substituted for the monetary figures. It may be of service to explain that these "dash" marks are used, as a rule, when the declaration of a final dividend is in some doubt. For instance, a company may declare a lesser interim dividend than it did in the previous year, thus indicating the possibility of the final payment being also lowered. In such cases, it might be misleading to give a yield worked out on the basis of the previous full year's dividend.

An Illustration

As an example, Plessey can be quoted. For the previous year, the company paid 30 per cent dividend, in two amounts of 15 per cent each. Six months ago, the interim dividend was reduced from 15 per cent to 10 per cent. Therefore, to leave the yield calculated upon 30 per cent would probably be incorrect, and events show this to be so, because the company, in

(*Continued on page* 69)

ELECTRICAL INVESTMENTS

Past Month's Price Changes

Company	Est. Comp.*	Last Div.	Middle Price 31 Dec. 1947	Month's Rise or Fall	Yield p.c.
Home Electricity Ordinary					£ s. d.
Bournemouth and Poole	66/8	12½	63/–	+2/–	3 19 4
British Power and Light	37/10	8	36/–	+1/6	4 9 0
City of London ..	34/4	7	33/–	+1/9	4 4 10
Clyde Valley ..	46/5	8	44/–	+1/6	3 12 9
County of London	49/5	10	47/6	+1/6	4 4 2
Edmundsons ..	31/6	6	30/6	+1/6	3 18 8
Elec. Dis. Yorkshire	51/–	9	45/6	+1/–	3 14 0
Elec. Fin. and Securities ..	67/–	15	62/–	+1/–	4 18 4
Elec. Supply Corporation ..	50/8	10	48/–	+2/–	4 3 4
Lancs. Light and Power ..	37/7	7½	26/–	+1/6	4 7 0
Llanelly Elec. ..	29/1	6	27/6	+1/–	4 7 3
Lond. Assoc. Electric	29/6	6	28/–	+1/–	4 5 9
London Electric	31/4	6	29/6	+6d.	4 1 4
Metropolitan E.S.	48/–	9	46/–	+2/–	3 18 3
Midland Counties	51/5	8	49/6	+2/–	3 4 9
Mid. Elec. Power	47/–	9	44/6	+2/–	4 1 0
Newcastle Elec...	32/7	7	30/–	..	4 13 4
North Eastern Elec.	36/6	7	35/–	+1/6	4 0 0
Northampton ..	50/11	10	48/–	+1/6	4 3 4
Northmet Power.	48/2	9	45/6	+1/6	4 1 4
Scottish Power ..	46/1	9	44/–	+1/6	3 18 3
Southern Areas..	24/–	5½	23/–	..	4 15 8
South London ..	33/–	7	30/6	+6d.	4 11 10
Yorkshire Elec...	50/10	9	48/6	+2/–	3 14 0

Company	Dividend Previous	Dividend Last	Middle Price 31 Dec. 1947	Month's Rise or Fall	Yield p.c.
Public Boards					
Central Electricity:					
1993–93 ..	3½	3½	103½	+1½	3 7 8
1974–94 ..	3½	3½	102	+1	3 3 9
Overseas Electricity Companies					
Atlas Elec. ..	Nil	Nil	14/6	+6d.	—
Calcutta Elec. ..	6†	6†	50/–	–1/6	2 8 0
Cawnpore Elec...	13	13	58/9	+5/16	4 8 5
East African Power	7	7	44/–	..	3 3 6
Jerusalem Elec...	5	6	21/3	–3/3	5 12 10
Madras Elec. ..	8	5	41/6	–2/–	2 8 4
Nigerian Elec. ..	12½	10	38/9	+½	5 3 1
Palestine Elec. "A"	6†	7†	31/9	..	4 8 2
Perak Hydro-elec.	6	7	16/–	+½	—
Tokyo Elec. 6% .	—	—	60½	+7	—
Victoria Falls Power	19	19½	6⅝	+⅜	2 18 0
Whitehall Inv. Pref.	—	6	25/6	+6d.	4 14 1
Equipment and Manufacturing					
Aron Elec. Ord...	10	15	52/6	+½	5 14 0
Assoc. Brit. Eng.	12	12	35/–	..	6 17 2
Assoc. Elec.:					
Ord.	10	15	87/6	+8/9	3 8 6
Pref.	8	8	43/6	..	3 13 6
Automatic Tel. & El.	12½	12½	67/–	+8/9	3 14 7
Babcock & Wilcox	12½	15	75/9	+⅞	3 19 2

Company	Dividend Previous	Dividend Last	Middle Price 31 Dec. 1947	Month's Rise or Fall	Yield p.c.
Equipment and Manufacturing (*Continued*)					£ s. d.
Baldwin, H.J. (2/–)	10	20	10/–	..	4 0 0
British Aluminium	8	10	53/6	+5/3	3 14 8
B.I. Callender's..	—	6¾	40/6	+3/6	3 6 0
British Rola (2/–)	15	15	4/6	+9d.	6 13 4
British Thermostat (5/–)	18½	23½	26/3	+⅛	4 9 6
British Vac. Cleaner (5/–)	30	20	15/6	+1/–	6 9 0
Brush Ord. (5/–)..	4	—	7/6	+⅛	—
Burco (5/–) ..	20	35	27/–	+9d.	6 9 8
Chloride El. Storage	20	20	5½	+¼	3 16 2
Christy Bros. ..	17½	17½	80/–	+½	4 7 6
Cole, E. K. (5/–)..	20	30	18/–	+1/–	5 11 2
Cossor, A. C. (5/–)	12½†	25	18/6	..	6 15 2
Crabtree (10/–) ..	17½	17½	46/–	+7/3	3 16 1
Crompton Parkinson Ord. (5/–) ..	22½	22½	30/6	+½	3 13 9
De La Rue (5/–)	45	50	52/6	+½	4 15 3
Decca (1/–) ..	112½	112½	41/3	+10/–	2 14 10
E.M.I. (10/–) ..	8	6	20/9	+½	2 17 9
Elec. Construction	12½	12½	50/–	+½	5 0 0
Enfield Cable Ord.	12½	7½	38/3	–6d.	3 18 6
English Electric .	10	10	56/3	+½	3 11 2
Ericsson Tel. (5/–)	20†	20†	45/–	+½	2 4 6
Ever Ready (5/–)	40	40	39/–	+6/–	5 2 7
Falk Stadelmann	10	15	47/6	+½	6 6 4
Ferranti Pref. ..	7	7	35/6	+6d.	3 19 0
G.E.C.:					
Pref.	6½	6½	36/–	+3d.	3 12 3
Ord.	17½	17½	95/–	+8/9	3 13 8
General Cables (5/–)	25	50	47/6	+10/–	5 5 4
Greenwood & Batley	15	15	46/3	+3/–	6 9 9
H.T.A. (10/–) ..	10	10	16/3	+1/9	6 3 0
Heatrae (2/–) ..	12½	12½	5/–	..	5 0 0
Henley's (5/–) ..	20	20	26/–	..	3 17 0
4½% Pref. ..	4½	4½	25/–	..	3 12 0
Hopkinsons ..	20	22½	5⅛	+⅛	4 4 8
Intl. Combustion (5/–)	32½	37½	53/9	+½	3 9 9
Johnson & Phillips	15	15	76/3	+½	3 18 9
Lancashire Dynamo	22½	22½	6	+⅞	3 15 0
Laurence, Scott (5/–)	12½	12½	13/–	+1/6	4 16 2
London Elec. Wire	7½	10	45/–	..	4 9 0
Mather & Platt ..	10	11	55/–	+5/6	4 0 0
Metal Industries (B)	9	10	48/9	+⅛	4 2 0
Mid. Elec. Mfg. ..	30	35	8½	+½	4 5 0
Murex	20	20	95/–	+½	4 4 10
Newman Ind. (2/–)	22½	22½	7/3	+6d.	6 4 5
Plessey (5/–) ..	30	20	22/–	–1/9	4 11 0
Parsons C. A. ..	—	12½	67/6	..	3 14 0
Pye Deferred (5/–)	25	25	25/–	+4/6	5 0 0
Radio & Tel. (2/–)	40	—	7/–	+2/–	—
Revo (10/–) ..	20	27½	53/6	+2/9	5 12 10
Reyrolle ..	12½	12½	68/3	+½	3 2 10
Scophony (5/–) ..	—	—	4/–	–6d.	—
Siemens Ord. ..	7½	7½	34/6	+2/–	4 7 0
Strand Elec. (5/–)	12½	17½	12/3	+1/6	7 2 10
Switchgear & Cowans (5/–) ..	25	10	20/–	+1/6	2 10 0
T.C.C. (10/–) ..	12½	15	31/3	+⅛	4 16 0
T.C. & M. ..	10	10	52/6	–⅛	3 16 2

* Proposed amount of British Electricity Stock to be allotted.
† Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price 31 Dec. 1947	Month's Rise or Fall	Yield £ s. d.
Equipment and Manufacturing (*Continued*)					
Telephone Mfg.(5/–)	9	9	10/6	+1/16	4 5 9
Thorn Elec. (5/–)	20	25	23/9	+1/16	5 5 3
Tube Investments	22½	25	7½	+10/–	3 9 0
Vactric (5/–) ..	Nil	Nil	12/6	–¼	—
Veritys (5/–) ..	7½	2½	5/–	..	2 10 0
WalsallConduits(4/–)	55	70	51/3	..	5 9 4
Ward & Goldstone (5/–)	35	50	67/6	..	3 15 9
Watford (2/–) ..	15	15	6/9	+6d.	4 9 0
WestinghouseBrake	14	14	72/6	+10/–	3 17 3
West, Allen (5/–)	7½	10	11/–	+1/-	4 11 0
Traction and Transport					
Brit.Elec.Traction: Def. Ord. ..	45	50	1500	+175	3 6 8
Pref. Ord. ..	8	8	190	..	4 4 3
Calcutta Trams..	7½	Nil	38/6	+8/6	—
Cape Elec. Trams	5	6	31/–	–1/6	3 17 0
T. Tilling ..	10	10	76/–	+8/6	2 12 8
West Riding ..	10	12	65/–	+10/–	3 13 10

Company	Dividend Previous	Dividend Last	Middle Price 31 Dec. 1947	Month's Rise or Fall	Yield £ s. d.
Telegraph and Telephone					
Anglo-Am. Tel.: Pref.	6	6	130	–4	4 12 4
Def.	1½	1½	27	–2½	5 11 1
Anglo-Portuguese	8	8	30/-	+1/–	5 6 8
Cable & Wireless: 5½ Pref. ..	5½	5½	121½	+1	4 10 6
Ord.	4	4	176	+4½	2 5 5
CanadianMarconi$1	Nil	4 cts.	10/–	..	—
Globe Tel. & Tel.: Ord.	8½†	5†	48/9	+6/9	2 1 1
Pref.	6	6	32/6	+6d.	3 13 10
GreatNorthernTel. (£10)	18	15	27½	..	5 9 1
Inter. Tel. & Tel.	Nil	Nil	17½	..	—
Marconi-Marine..	7½	7½	32/6	+3/8	4 12 4
Oriental Tel. Ord.	4	10	54/6	+1/4	3 13 5
Telephone Props.	6	6	18/6	..	6 9 9
Tele. Rentals (5/–)	10	10	12/6	+1/16	4 0 0

† Dividends are paid free of Income Tax.

Stocks and Shares

(*Continued from page 67*)

declaring a final dividend of 10 per cent, making 20 per cent for the year, distributes 10 per cent less than it did for the previous twelve months. The yield on Plessey shares can now be given in the column, because the final results are available, but until these came out it was safer to indicate the doubt that existed by giving a "dash" sign, instead of a yield worked out on the basis of last year's 30 per cent dividend.

Trustees and Investment

The Government's persistent refusal to enlarge the circle of investments eligible for strict trusts, is leading to a new development in various investment quarters. Trustees who are compelled at present to hold trustee securities, and who feel none too easy in their minds at the probable course of prices of these stocks, are taking steps to apply for powers to enable them to enlarge the scope of stocks and shares available to them. That is to say, it is sought to include even ordinary shares of first class character in the lists which hitherto have been circumscribed by the Trustee Act.

Miscellaneous Matters

In view of the usually restricted market in General Cable Manufacturing 5s. ordinary shares, it is worth drawing attention to a line of shares at present in the market at 48s. ex-dividend. They yield £5 2s. 6d. per cent on the recently doubled distribution of 50 per cent. Other relatively high yielders are Dictograph Telephone 2s. ordinary at 5s. 3d., the return being £6 2s. 0d. per cent, on the dividend raised last November from 11 to 16 per cent. Electric & General Investment ordinary stock was marked up to 300 on the purchase offer; the last previous recorded bargain was at 130. Uruguay's purchase of Atlas Electric's tramway subsidiary in Montevideo is reported to have been completed, the consideration being £1,814,000. The ordinary, on this, hardened to 14s. 9d., and the preference to 33s. 6d. Cable & Wireless stockholders are resigned to a further delay of two months or so before the arbitration over the compensation figure begins in earnest.

The Overseas Group

Lack of space precluded inclusion of an interesting group in our last week's tables of comparative prices. The overseas electrical shares are interesting more particularly for a substantial rise in Victoria Falls Power ordinary,

Share	31 Dec., 1946	31 Dec., 1947	Rise or fall
Atlas Elec.	10/–	14/3	+ 4/3
Calcutta Elec.	49/6	50/–	+ 6d.
Cawnpore Elec. ..	57/6	58/9	+ 1/16
East African Power ..	47/–	43/6	– 3/6
Jerusalem Elec.	24/–	21/3	– 2/9
Madras Elec.	36/–	41/6	+ 5/6
Palestine Elec. "A" ..	36/6	32/–	– 4/6
Perak Hydro-Elec. ..	15/–	16/–	+ 1/–
Tokyo Electric 6% ..	47½	60½	+ 13
Victoria Falls Power ..	5 1/16	6½	+ 18/9
Whitehall Inv. Pres. ..	28/6	25/6	– 3/–

while the movements in Indian industrials also deserve notice. Politics were the principal factor in determining price-changes of the Palestine issues. Violent fluctuations in Tokyo Electric Sixes left a net rise of 13 points on the year.

Next Week's Events

Monday, 12th January

MANCHESTER.—Milton Hall, Deansgate, 7 p.m. Institution of Heating and Ventilating Engineers (Manchester and District Branch). "Air Conditioning Plant for Cotton Mills," by A. L. Longworth.

At the Geographical Society, 16, St. Mary's Parsonage, 7 p.m. Junior Institution of Engineers (North-Western Section). Chairman's address, "Some Notes on the Production of Alternating Current Circuits," by H. H. Daniels.

NEWCASTLE-ON-TYNE.—Neville Hall, Westgate Road, 6.15 p.m. I.E.E. North-Eastern Centre. "Comparisons between Gas and Electricity on the Basis of Coal Economy," by P. Schiller.

Tuesday, 13th January

LONDON.—At the Lighting Service Bureau, 2, Savoy Hill, W.C.2, 6 p.m. Illuminating Engineering Society. "Applications of Modern Flash Discharge Tubes," by C. R. Bicknell.

BRISTOL.—Grand Hotel, Broad Street, 7.30 p.m. Junior Institution of Engineers (Western Group). "Electrical Equipment of Automobiles," by J. Bebbington.

CAMBRIDGE. — Cambridgeshire Technical College, 6 p.m. I.E.E. Cambridge Radio Group. Address by C. E. Strong (chairman, Radio Section).

LEEDS.—Corporation Electricity Department, Whitehall Road, 6.30 p.m. I.E.E. North Midland Centre. "Neutral Earthing of Three-Phase Systems, with particular reference to Large Power Stations," by J. R. Mortlock and C. M. Dobson.

DERBY.—Electricity Showrooms, 6.30 p.m. I.E.E. East Midland Centre. "Some Observations on Oil Deterioration in Transformers and Switchgear," by H. Hurworth.

MANCHESTER.—Engineers' Club, Albert Square, 6 p.m. I.E.E. North-Western Transmission Group. "The Lightning Surge Strength of Power Transformers," by E. T. Norris.

BELFAST.—Queen's University, 6.45 p.m. I.E.E. Northern Ireland Centre. "Record of Experience on the Irish Electricity Supply System," by A. Burke, R. C. Cuffe and W. O'Neill.

Wednesday, 14th January

EDINBURGH.—Heriot-Watt College, 6 p.m. I.E.E. Scottish Centre. "The Teaching of the Principles of Electrical Machine Design," by L. H. A. Carr.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Radio Section. "Reference-Crystal Controlled V.H.F. Equipments," by D. M. Heller and L. C. Stenning.

SHEFFIELD.—Royal Victoria Station Hotel, 6.15 p.m. I.E.E. Sheffield Sub-Centre. "Electrical Aspects of Overhead Travelling Cranes," by G. V. Sadler.

MANCHESTER.—Lower Albert Hall, Peter Street, 2.30 p.m. Institute of Fuel (Manchester Branch). "Urmston District Heating Scheme," by Mr. Hancock.

NORTHAMPTON.—College of Technology, St. George's Avenue, 7.15 p.m. Northampton and District Electrical Association. "Television—Early Days and Future Prospects," by G. W. Godfrey.

BRADFORD.—Midland Hotel, 7 p.m. Association of Supervising Electrical Engineers (Bradford Branch). "Electrical Equipment of Machine Tools," by C. Rhodes.

Thursday, 15th January

LONDON.—Savoy Place, W.C.2, 5.30 p.m. Institution of Electrical Engineers. "Standardization of Switchgear," by D. E. Lambert and J. Christie.

HUDDERSFIELD. — Electricity Department's Offices, 7 p.m. E.P.E.A. (Northern Meter and Instruments (Technical) Group). "Industrial Electronics," by P. H. Briggs.

DUBLIN.—Trinity College, 6 p.m. I.E.E. Irish Branch. "Joint Operation of Thermal and Hydro-Electric Stations in Eire," by B. McQuillan.

STOKE-ON-TRENT.—City Electricity Department, Kingsway, 7 p.m. E.P.E.A. Midland Technical Group. "Modern Illumination Technique," by J. C. Lowson.

CROYDON.—Café Royal, North End, 7.30 p.m. Association of Supervising Electrical Engineers (South London Branch). "Factory Maintenance (Mechanical)," by J. M. Williams.

GLASGOW.—At the Institution of Engineers and Shipbuilders, 39, Elmbank, 6 p.m. Illuminating Engineering Society (Glasgow Centre). "High Voltage Fluorescent Tubes," by H. G. Jenkins and J. H. Bowtell.

Friday, 16th January

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Measurements Section. "Survey of Metering Practice on the British Grid System," by F. Byrne.

BIRMINGHAM.—Imperial Hotel, Temple Street, 6 p.m. Illuminating Engineering Society (Birmingham Centre). "Recent Applications of High Speed Flash Discharge Tubes," by C. R. Bicknell.

Saturday, 17th January

LEEDS.—City Electricity Department, Whitehall Road, 2.30 p.m. I.E.E. North Midland Students' Section. Main Centre chairman's address, by E. S. Ritter.

I.E.C. Central Office

From 26th January the address of the Central Office of the International Electrotechnical Commission will be 39, Route de Malagnou, Geneva, Switzerland.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1942

ENGLISH Electric Co., Ltd., and R. J. Welsh.—"Means for controlling the cyclic operation of components of a power plant." 15121 and 15552. 28th October, 1942 and 4th November, 1942. (595546 and 595548.) "Means for starting reciprocating internal-combustion engines." 15122. 28th October, 1942. (595547.)

1943

Sodeco Soc. des Compteurs de Genève.—"Prepayment telephone apparatus." 4807. 15th January, 1942. (595708.)

English Electric Co., Ltd., R. J. Welsh and G. W. Cox.—"Means for starting reciprocating internal-combustion engines of free-piston type." 8649. 31st May, 1943. (Cognate application 15288/43.) (595670.)

General Electric Co., Ltd., and C. G. Eden.—"Thermostats." 14713. 8th September, 1943. (Cognate application 21457/43.) (595626.)

English Electric Co., Ltd., and R. J. Welsh.—"Control of a plurality of internal-combustion engine-driven compressors." 14904. 10th September, 1943. (595746.) "Means for controlling the cyclic operation of components of a power plant." 19398. 19th November, 1943. (Addition to 595546.) (595747.)

1944

Russell Bros., Ltd., and H. B. Russell.—"Combined kitchen cabinet and refrigerator." 1729. 31st January, 1944. (595671.)

Standard Telephones & Cables, Ltd.—"Electric induction heating of metals." 3059. 25th February, 1943. (595672.) "Selenium rectifier." 7987. 13th May, 1943. (595787.)

English Electric Co., Ltd., and R. J. Welsh.—"Power plant comprising a prime mover and an internal-combustion compressor supplying motive fluid thereto." 4191. 7th March, 1944. (595627.)

Marconi's Wireless Telegraph Co., Ltd.—"Thermionic valve circuit." 9031. 11th May, 1943. (595673.) "Storage amplifier and magnetic detector circuit arrangements." 9032. 11th May, 1943. (595674.) "Phase modulation detectors." 15302. 3rd April, 1943. (595602.)

International Business Machines Corporation.—"Electrical item comparing systems." 12675. 17th April, 1943. (595556.)

Communication Engineering Pty., Ltd.—"Multi-channel telephone systems." 16070. 2nd August, 1943. (595712.)

Western Electric Co., Inc.—"Method of making fine wire contacts for use in electrical apparatus." 13950. 16th March, 1943. (595601.)

Robertshaw Thermostat Co.—"Automatic temperature or pressure control apparatus for operating electric switches." 20385. 2nd November, 1943. (595718.)

R. S. Bennett, G. F. Gittins and J. F. Bridge.—"High-frequency melting furnaces and their operating coils." 20996. 27th October, 1944. (595636.)

Ace Electronics, Ltd., L. C. Welch and R. J. Cook.—"Electrical apparatus for measuring the proportions of mixtures and solutions." 21739. 6th November, 1944. (595720.)

W. B. Holden and W. H. Chancellor.—"Liquid level operated electrical control gear." 9401. 16th May, 1944. (595750.)

B. V. Rollin and C. S. Wright.—"Multi-resonator magnetrons." 10110. 24th May, 1944. (595868.)

British Thomson-Houston Co., Ltd.—"Methods of and apparatus for absorbing decomposition products in liquid-insulated electrical apparatus." 11240. 12th June, 1943. (595752.)

1945

G. M. Ettinger.—"Reciprocating electric motors." 77. 1st January, 1945. (595722.)

J. A. Tanner.—"Electric control systems." 1216. 15th January, 1945. (Cognate application 33476/45.) (595726.)

B. W. Cooke.—"Electric lighting sets for cycles." 1280. 16th January, 1945. (595613.)

Maschinenfabrik Oerlikon.—"Arrangement for synchronizing rotor-fed three-phase current shunt commutator motors." 5705. 8th March, 1944. (595561.)

Marconi's Wireless Telegraph Co., Ltd.—"Multiplex intelligence transmission system." 7420. 24th March, 1944. (595730.) "Frequency modulation of electric oscillations." 12230. 16th May, 1944. (595698.) "Tensioning devices for controlling the unwinding of fine material." 12534. 18th May, 1944. (599699.) "Electric pulse modulation system." 12648. 5th January, 1944. (595624.)

Eralite Manufacturing Co., Ltd., and E. J. Wray.—"Electric heaters." 9721. 18th April, 1945. (595694.)

Foster Transformers & Switchgear, Ltd., R. I. Bagnall and C. R. E. Legg.—"Apparatus for electric arc welding." 11560. 7th May, 1945. (595697.)

British Thomson-Houston Co., Ltd.—"Protective coatings for copper articles." 12538. 22nd May, 1944. (595565.)

Truvox Engineering Co., Ltd., and L. R. Ward." — "Electro-dynamic loudspeakers or

microphones." 13342. 28th May, 1945. (595739.)

H. E. Bayliss.—" Method of and apparatus for producing electric resistances." 14011. 4th June, 1945. (Cognate application 14012/45.) (595705.)

A. Bolton.—" Electro-magnetic waveguides." 15381. 16th June, 1945. (595653.)

Honorary Advisory Council for Scientific and Industrial Research.—" Electrically conductive articles and method for producing the same." 16315. 14th April, 1945. (595745.)

A. Rosenberg.—" Current supplying stands for electrically heated pressing irons." 17291. 6th July, 1945. (595573.)

Standard Telephones & Cables, Ltd., and C. K. Fitch.—" Manufacture of multi-part leads for vacuum tubes and the like." 17302. 6th July, 1945. (595577.)

Westinghouse Electric International Co.—" Arc confining and extinguishing structures for electric circuit interrupters." 17314. 7th July, 1944. (595656.)

Sir H. Ingram.—" Fixed electrical condensers." 17318. 6th July, 1945. (595657.)

English Electric Co., Ltd., and N.H. Shaw.—" Inductive windings." 17683. 11th July, 1945. (595660.)

Heatrae, Ltd., C. H. Smith and C. Ellis.—" Connection of pipes, electric immersion heaters and similar apparatus to tanks and cisterns." 17720. 11th July, 1945. (595584.)

Furzehill Laboratories, Ltd., and L. Namenyi-Katz.—" Electrical or magnetic apparatus actuated by the passage of articles, such as bank-notes, through it." 1558. 23rd December, 1943. (Divided out of 595748.) (595764.)

General Electric Co., Ltd., S. V. Williams and G. H. S. Price.—" Manufacture of articles from metallic powders." 1900. 24th January, 1945. (595793.)

E. Mestitz.—" Combined switches and electric couplings." 4613. 19th February, 1946. (Addition to 591638.) (595848.)

United Insulator Co., Ltd., N. G. Westcombe and L. Macfarlane.—" Arrangements for hermetically sealing electrical apparatus in casings." 6189. 12th March, 1945. (595796.)

Induction Heating Corporation.—" Cooling system for electron discharge tubes." 9447. 27th May, 1943. (595850.)

Standard Telephones & Cables, Ltd.—" Metal contact rectifier." 11865. 1st June, 1944. (595853.) " Variable electric condenser." 18707. 27th February, 1943. (595895.)

W. F. Brown.—" Voltage stabilizing circuits." 15187. 14th June, 1945. (595804.)

Electrical Components, Ltd., and W. Summer.—" Electrical signalling systems." 15206. 15th June, 1945. (595805.)

A. H. Hunt, Ltd., and R. A. Grouse.—" Apparatus for the manufacture of metallized paper for electric condensers." 16642. 29th June, 1945. (595808.)

G. M. Engineering (Acton), Ltd., and J. Newell.—" Electrical power distribution systems." 17734. 11th July, 1945. (595819.)

N. F. Astbury and C. S. Wright.—" Electrical amplifying apparatus." 18038. 14th July, 1945. (595824.)

E. N. Bray, Ltd., and E. N. Bray.—" Apparatus for the electrical control of the timing of processes." 18681. 20th July, 1945. (595890.)

Metropolitan-Vickers Electrical Co., Ltd., and E. Crooks.—" Feeding arrangements for machine tools." 18735. 21st July, 1945. (595897.)

J. A. Crabtree & Co., Ltd., and R. W. Morgan.—" Holders for double ended electric lamps." 18744. 21st July, 1945. (595900.)

1946

English Electric Co., Ltd., and K. F. Barlow.—" Cooling of welding or heating electrodes." 5802. 24th February, 1945. (Divided out of 592598.) (595585.)

English Electric Co., Ltd., and N. H. Shaw.—" Inductive windings." 19764. 11th July, 1945. (Divided out of 595660.) (595665.)

Amended Specifications Published

585290. British Thomson-Houston Co., Ltd.—" Wave guide structures."

585263. Standard Telephones & Cables, Ltd.—" Radio frequency carrier current communication systems."

581349. T. Grocott and another.—" Insulators and method of mounting same."

Trade Marks

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month from 31st December:—

DETEKTROLEX. No. 651,021, Class 9. Instruments for indicating the condition of electrical circuits.—E. R. Ward, trading as Ward's Electrical Service, Westergate Street, Westergate, near Chichester, Sussex.

MONITOR. No. 651,884, Class 9. Sound recording, reproducing, transmitting and receiving apparatus and instruments, and radio receiving sets (complete).—Monitor Engineering & Oil Appliances, Ltd., also trading as Monitor Radio & Communications Co., Monitor Works, Flaxley Road, Stechford, Birmingham, 9.

STAX. No. B653,435, Class 9. Radio apparatus and parts thereof all included in Class 9.—Truvox Engineering Co., Ltd., Truvox House, Exhibition Grounds, Wembley.

REGAVOLT. No. 653,942, Class 9. Transformers for electric current.—British Electric Resistance Co., Ltd., Ohmic Works, Queensway, Ponders End, Middlesex.

CARAFRIG. No. 653,274, Class 11. Refrigerating apparatus and installations and parts thereof included in Class 11.—Sanutrene, Ltd., Crown Works, 197, Lower Richmond Road, Richmond, Surrey.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Cleethorpes. — 9th February. Electricity Department. Four 500-kVA transformers. (See this issue.)

East Lothian.—14th January. County Council. Electrical work for primary school, Dunbar. County architect, Haddington.

Hull.—23rd January. Electricity Department. One indoor type 3-phase transformer. (See this issue.)

Kettering.—30th January. Electricity Department. Two 11-kV, 3-phase, 250,000-kVA, duplicate busbar, metalclad switch units. (26th December.)

Manchester.—19th January. Electricity Committee. One 10-MVA transformer. (See this issue.)

26th January. Electricity Committee. 33-kV switchgear. (See this issue.)

New Zealand.—2nd March. 10-ton electric overhead travelling crane for Maratai power station (Contract 69) and 220-kV air-break switchgear for Bunnythorpe and Haywards substation (Contract 70). N.Z. Trade Commissioner, Melbourne.

Plymouth.—31st January. Electricity Department. 500-MVA, 33,000-V metalclad switchgear. (See this issue.)

Southend-on-Sea.—30th January. Corporation. 33/11-kV transformer, 33-kV indoor switchgear, and 33-kV and 66-kV cables. (2nd January.)

Wandsworth.—21st January. Borough Council. Fluorescent lighting in Rates Hall, Municipal Buildings. (2nd January.)

Woolwich.—25th February. Electricity Department. Four voltage regulators, two mercury arc rectifiers and two outdoor transformers. (2nd January.)

Orders Placed

Manchester.—Electricity Committee. Accepted. Four 30,000 lb pulverized fuel fired boilers.—Babcock & Wilcox. Sub-contractors for fans, f.d. and i.d.—Jas. Howden & Co. (Land); electric motors.—Laurence, Scott & Electromotors; valves and fittings.—Hopkinsons; boiler control panels.—Metropolitan-Vickers Electrical Co. New diaphragm and blading No. 1 turbo-generator set, Barton.—Metropolitan-Vickers Electrical Co. Switchgear remote control equipment.—Standard Telephones & Cables.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors. It must be borne in mind that many of the projects mentioned may be postponed as a result of the Government's suspension of building activities for the time being.

Aintree.—School, Aintree Lane (£113,655), for Lancs E.C.; county architect, Preston.

Alnwick.—Houses (140) for R.D.C.; Reavell & Cahill, Lloyds Bank Chambers.

Bellingham (Northumberland).—Two schools (£70,000); county architect, County Hall, Newcastle-on-Tyne.

Blackburn.—Additions to Queen's Park Hospital and Institution, including two lifts, ward heating appliances, etc., for P.A.C.; borough engineer.

Cheltenham.—Houses (52), west of Ashchurch Station; Holt Brewery Co., Ltd., Holt Street, Aston Cross, Birmingham.

Chester-le-Street.—Houses(50) at South Pelaw; U.D.C. surveyor.

Cork.—Houses (90), Rathluiré, for C.C.; J. Shesnan, quantity surveyor, 20, South Mall.

Croydon.—Traditional houses (130), and B.I.S.F. houses (100), first National Housing Trust Estate; borough engineer.

Dagenham.—Factory, Ripple Road, for Deyong, Ltd.; S. Williams & Sons, builders, 8, Lloyds Avenue, E.C.3.

Darlington.—Sunday School, and social centre, Carmel Road South; Bussey & Armstrong, builders, Brinkburn Road.

Temporary additions to Maternity Hospital (£3,300); borough architect.

Durham. — "Airey" houses (20) for the City Council; city engineer, Town Hall, Market Place.

Ecclesfield.—Junior school, Monteney Crescent, for West Riding C.C.; county architect, Balne Lane Offices, County Hall, Wakefield.

Gateshead-on-Tyne.—Extensions to works of the Redheugh Iron & Steel Co.; plans by the firm's own staff.

Greenock.—Industrial estate—two factory blocks (£160,000) for light engineering; Scottish Industrial Estates, Ltd., Glasgow.

Hebburn-on-Tyne.—Extensions to the impulse test laboratory at A. Reyrolle & Co.'s works; Cackett, Burns Dick & McKellar, 21, Ellison Place, Newcastle-on-Tyne.

Hereford.—Warehouse, Millbrook Street; C. Corey, 40, Cotterell Street. New premises,

Holmer Road, West Midland Egg Packers, Ltd.; Scriven, Powell & James, Cathedral Chambers, King Street.

Jarrow.—Platers' shop for the Mercantile Dry Dock Co., Ltd.; Harbour & General Works Co., Ltd., builders, Cannon Row, London, S.W.1.

Kensington.—Flats (86) in two blocks at Sheffield Terrace and Tor Gardens; Gollins, Melvin & Partners, 42, Bruton Place, Berkeley Square, W.1.

Leeds.—Flats (84), with laundry, Sweet Street, for Housing Committee; R. A. H. Livett, city architect, Priestley House, Quarry Hill.

Lichfield.—Electricity showrooms, offices, workshops and stores, The Friary (£45,640); borough surveyor, Guildhall, Bore Street.

Madehurst.—Police wireless station, Burton Down, West Sussex C.C.; F. R. Steele, county architect, County Hall, Chichester.

Mill Hill.—Secondary school, Fairway, for Middlesex E.C.; C. G. Stillman, county architect, Middlesex House, Vauxhall Bridge Road, S.W.1.

Newport (Mon.).—Houses (34), Ridgeway area; Community Housing (London), Ltd., 20, Victoria Street, S.W.1. Extensions to works, St. Stephen's Road; Ideal Polish Co., Ltd., 71, Shaftesbury Street.

North Riding.—Dining rooms and kitchens at teachers' training college in Filey Road, Scarborough, for the C.C.; county architect, County Hall, Northallerton.

North Shields.—Oil refinery for the Trent Oil Products, Ltd., Scunthorpe.

Tinsmiths' and millwrights' shops for Smith's Dock Co., Ltd.; W. Stockdale, architect, 73, Howard Street.

Northumberland.—Offices at Ashington and Amble for the Northern Divisional Coal Board, Newcastle-on-Tyne.

Perivale.—Additions to works; H. B. Drew & Co., Ltd., Western Works, Bideford Avenue.

Richmond (Yorks).—Houses (64) for T.C.; F. W. Shepherd & Son, York.

Roxburghshire.—Houses for agricultural workers (100); county architect, County Offices, Newtown St. Boswells.

Seaton Valley.—"Orlit" houses (50) for the U.D.C.; surveyor.

Shoreditch.—Flats (40), Felton Street, for B.C.; Walter Lawrence & Son, builders, 31, Sun Street, E.C.2.

Rebuilding factory, Britannia Walk and Ebenezer Street Corner; R. Pye & Co., Ltd., box manufacturers, 109, Britannia Street.

Stockton-on-Tees.—Joiners' shop, Bishopton Avenue, for R. Sparks & Son; Kitching & Co., architects, 21, Albert Road, Middlesbrough.

Houses (24) on the Highfield Estate; R. B. Bainbridge, builder, Prince Regent Street.

Smethwick.—Brewery extensions; Mitchells & Butlers, Ltd., Cape Hill Brewery.

Sunderland.—Three schools for E.C.; J. Murray, Education Offices, Tatem Street.

Alterations for Northern Airport, Ltd., Durham Road; G. T. Brown & Son, architects, 51, Fawcett Street.

Rebuilding of part of factory in Middle Street for W. Robson, Ltd.; J. Huntley & Sons, builders, Marion Street.

Trimdon (Co. Durham).—Police wireless station for Durham C.C.; county architect, Court Lane, Durham City.

Tynemouth.—Marden Avenue Infants' School for the E.C.; J. R. Wallace, architect, Northumberland Square, North Shields.

Houses (36) for the management and key-workers of Tyne Plywood Works, Ltd.; W. Stockdale, architect, 73, Howard Street, North Shields.

"Orlit" houses (100) for the T.C.; borough engineer.

Wakefield.—Refectory at Technical College, for Corporation E.C.; borough architect, Town Hall.

Wallasey.—Infants' school, Town Meadow Lane, Moreton, for T.C.; H. G. B. Construction Co. (Liverpool), Ltd., builders, Moreton.

Roman Catholic School, Rake Lane; Francis X. Velarde, 3, Abercromby Square, Liverpool.

Wearmouth Colliery (Co. Durham).—Miners' canteen; Miners' Welfare Commission, Ashtead, Surrey.

Wembley.—Factory and office, Beresford Avenue, for the Atlas Diesel Co.; William Moss & Sons, Ltd., builders, North Circular Road, N.W.2.

West Hartlepool.—Houses (157) on the Seaton Lane Estate; borough architect.

Maternity ward and ante-natal clinic at the Howbeck Institution (£12,000); borough engineer.

Westminster.—Block of flats (104), Pimlico Scheme, Block 1 (£265,000); Holloway Bros. (London), Ltd., contractors, Bridge Wharf, Millbank.

Winsford (Ches.)—Municipal offices; U.D.C. surveyor, Council Offices.

Wolverhampton. — County primary school, Perry Hall Estate, Wednesfield; A. C. H. Stillman, County Education Offices, Earl Street, Stafford.

British Columbia Power Schemes

THE first unit of the British Columbia Power Commission's $10,000,000 hydro-electric project on the Campbell River was inaugurated recently. The development will ultimately deliver 180,000 h.p. to Vancouver Island. The Commission is to proceed immediately with a $4,500,000 development at Whatsham Lake to supply power for Okanagan Valley irrigation projects, rural electrification and industrial use.